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OIL WORLD
and Petroleum Industry

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FIFTEEN CENTS

"For Friendly Service, and Dependable Products, Specify BAKER."

A WELL CEMENT RETAINER

BAKER
CEMENT RETAINER
CASE STUDY NO. 408

PROBLEM: To recement section of liner at bottom of uncased hole.

METHOD: Run Cement Retainer through 8032' of Open Hole and set near bottom of liner and squeeze cement.

RESULT: Cement job 100% successful

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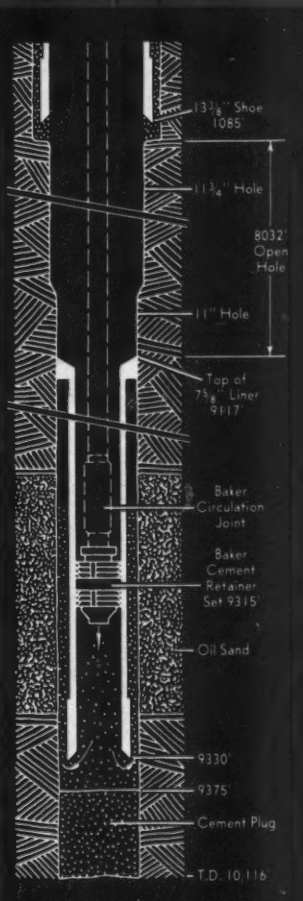
• DETAILS •

Field: Coalinga Area
Depth of Well: 9375'
Depth Retainer Set: 9315'
Breakdown Pressure: 2000 #
Final Pressure: 1000 #
Number of Sax Put Away: 75
How Cement Discharged: Around Shoe on bottom of Liner



Showing application of Baker Cement Retainer in recementing liner. Note that Retainer was run through 8032' of Open Hole

THE BAKER CEMENT RETAINER has provided the solution to many Cementing, Well Repair and Well Completion problems confronting the modern operator . . . perhaps it will solve a particular problem confronting YOU. Complete details concerning its many practical field applications will be found in the Baker section of the Composite Catalog . . . also in Baker Broadcast No. 17-A, a comprehensive, 40-page illustrated treatise which will be sent to interested oil men upon request.

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BAKER CEMENT RETAINER

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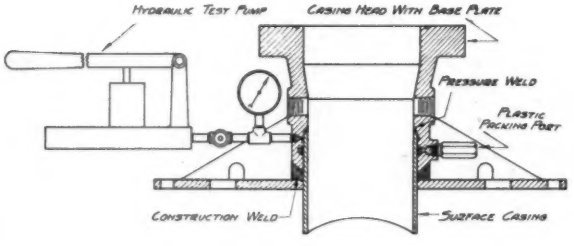
As shown in the cross-section drawing below, the casing head slips over the surface casing and is welded thereto. A construction weld is applied on the outside through an opening just above the base plate to support the mechanical load, and a pressure weld is applied on the inside to effect a seal. In order that the operator may be assured that this weld is pressure-tight, provision is made for testing the weld hydraulically. This test is accomplished by introducing pressure from a small hand pump to the space between the weld and a plastic packing seal. The plastic packing seal consists of a ring of packing recessed into the inner bore of the casing head, the ring being brought into sealing engagement with the casing by the injection of plastic packing through a ball-check valve port. It should be noted that this seal may be safely repacked under pressure and therefore assures the operator of a pressure-tight joint, even though the weld should develop a leak at some future date.

The photographs at left present, step by step, the installation of a Cameron Landing Base Casing Head: (1) Applying the construction weld on the outside; (2) applying the pressure weld on the inside; (3) injecting plastic packing to effect a seal below the pressure weld, and (4) testing the inner weld with 3000 lbs. hydraulic pressure.



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CALIFORNIA
OIL WORLD
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December 16, 1940

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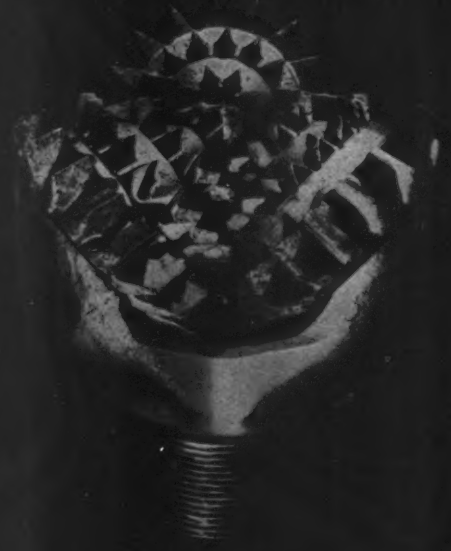
Oil..

A vital necessity of National Defense –



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Deep Rosecrans Well Spectacular Blow

Tamed by Ingenious Spear

One of the most spectacular and dangerous blowouts in recent years occurred at Rosecrans Dec. 7 when Rainbow Petroleum Co.'s Crawford No. 21 got out of control while pulling drill pipe after making a formation test. Casing had been cemented at 8315 ft. over the equivalent of the Eighth Callender zone and the hole had been cleaned out to bottom at 8543 ft. for the trial which resulted in a heavy gas blow with a considerable quantity of light condensation oil. While removing the tester, with 27 stands yet in the hole, the well started to blow but was shut in with the blow-out preventer. Pressure quickly built up to 2400 lbs. causing a leak in the cellar fittings and making it necessary to flow the well until it could be killed by pumping in water. At this time the gas was diverted through traps which recovered an appreciable amount of high gravity oil.

With the situation apparently under control, the crew again started out of the hole, but only four stands had been set back when the gas started to come, pushing the drill pipe ahead of it the length of four stands. The 2½-in. drill pipe was looped through the derrick like spaghetti and while the crew was attempting to cut it out to resume operations, the gas gave another mighty heave blowing the remaining drill pipe out and draping it through the rig.

For nearly 24 hours the well flowed unrestrained, blowing an estimated twenty to thirty million cu. ft. of wet gas through the drill pipe fouled derrick and forming a large cloud of gasoline vapor which was held down part of the time by low fog banks. Much apprehension was

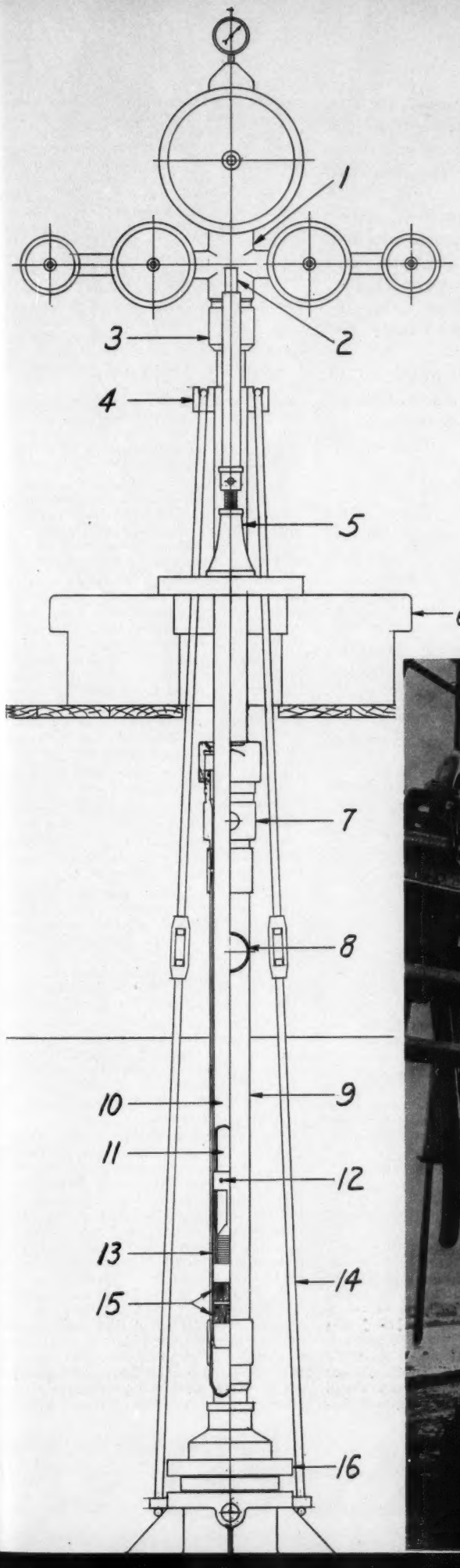
Here are the men who choked the dangerous blowout of Crawford No. 21. With the gas menace increasing by the minute because of the foggy weather, this Rainbow crew, headed by Eddie Hiles, succeeded in anchoring a Baash-Ross made spear in the throat of the threatening wild well. Left to right, they are: J. W. Vanderear, William I. Noel, Milt Yarberry, Rowland Freear, Eddie Hiles, Mac McCutchen, and Bob Bauer.

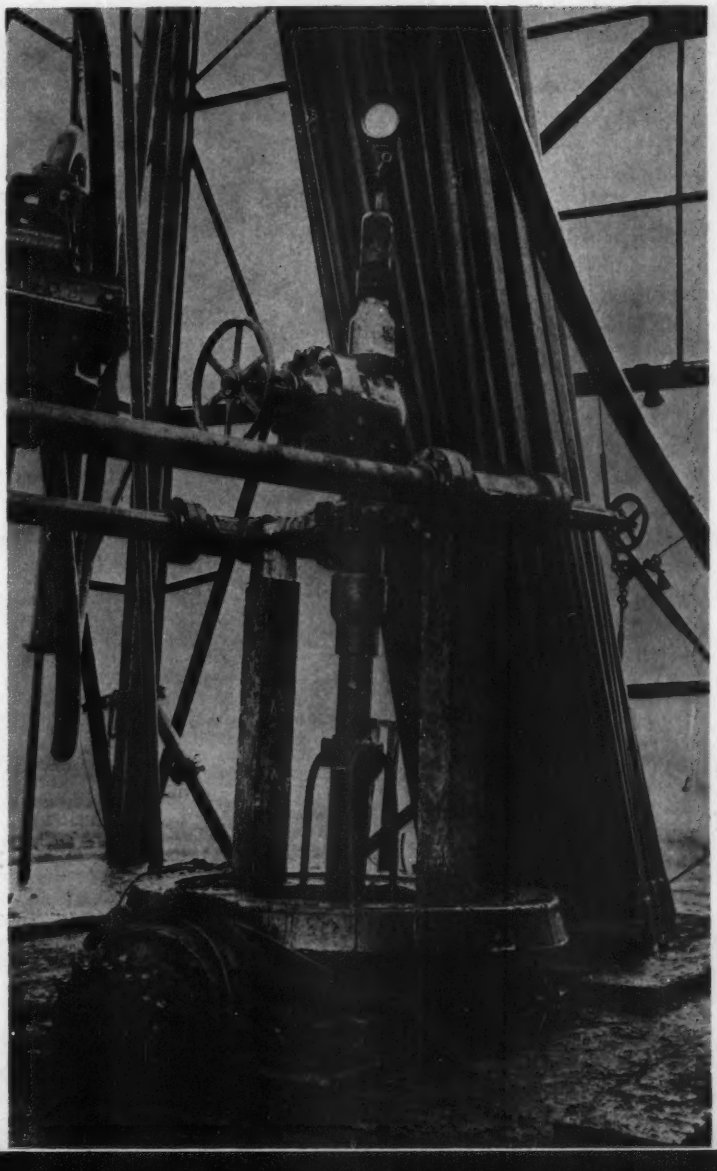
felt at this time because of the very great fire hazard.

The efficient and interesting manner in which the wild well was controlled is best told in the following words of Glenn D. Johnson, chief engineer for Baash-Ross Tool Co. which designed and built the equipment used. The mechanical detail of the assembly is shown in the accompanying diagram prepared for California Oil World by Mr. Johnson.

"In less than six hours after the Baash-Ross Tool Co. received the request for services, the packer which was used in bringing the well under control was delivered to the rig. In rigging up the packer preparatory to stabbing it in the 6⅝-in. riser nipple, considerable time was consumed, but when everything was in readiness the packer assembly comprising the packer itself, spacing nipple and control sleeve, cross and high pressure gate valves, were hoisted by a boom crane and entered through the window of the derrick to a point directly over the hole. This operation was extremely tedious as the utmost care was necessary in moving the boom and packer in and around the twisted mass of drill pipe which had been ejected from the well so as not to cause any spark-striking metallic impacts which might have ignited the gas.

"Before positioning the packing assembly over the hole, a pull down





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1—3x3x6x6 high pressure cross. **2**—Supporting lug welded to cross. **3**—4¾x6 adapter. **4**—Hold down lugs welded to control sleeve. **5**—screw jack used in setting packer. **6**—rotary table. **7**—Baash-Ross blowout preventer. **8**—6⅝-in. flow line. **9**—6⅝-in. A.P.I. riser nipple. **10**—5½-in. A.P.I. control sleeve. **11**—4¾-in. A.P.I. tool body. **12**—shear pin on slips. **13**—hold down slips. **14**—tie down rod. **15**—lead packing. **16**—Baash-Ross welded suspension casing head.

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rig was installed which consisted of a ⅝-in. wire line, controlled by a winch which was set at a safe distance from the well, and was run under the derrick through a snatch block which was fastened to a cellar control head-up through the table opening and around a second snatch block which was tied at the upper end of the packing assembly adjacent to the cross. The line then returned through the rotary table opening and was fastened to the cellar control head at a point diametrically opposite the first mentioned snatch block.

"In order to stabilize the packing assembly and to hold it directly over the well opening during the stabbing operation, four manila ropes were used, one each being snubbed around a leg of the derrick. The opposite ends of the ropes were tied to a loose fitting ring which encircled the packing assembly approximately three feet from its lower end. To prevent the ring from dropping off the lower end of the packing assembly and to mount it so that it would not interfere with the insertion of the packer in the riser nipple, the ring was supported on the packing assembly by means of a manila rope tied to the ring and to the cross of the packing assembly.

"With the packer positioned directly over the well and stabilized against lateral movement in the manner above mentioned, the boom line was paid off as the winch line drew the packer into the well casing. When the packer was stationary at the desired level, heavy duty oil field jacks were used to expand the slips in pipe engaging position and to effect the seal between the packing assembly and the well casing. The jacks were placed below the vertical arms of the cross and above the hold-down lugs welded to the control sleeve. During this operation the 6-in. gate valve at the upper end of the packing assembly was open thus allowing most of the volume to pass through the tool. However, as the slips were engaged and the packing expanded, the flow in the annulus was closed off. The boom line was then disconnected and the hold-down arrangement as shown in the sketch was hooked up before the winch line was removed. The flow manifold was then hooked up and the 6-in. gate valve at the upper end of the packing assembly was closed to divert the flow through the choke valves and into the traps."

Under control, Crawford No. 21 is flowing three to four million cu. ft. of gas from which the traps recovered 150 bbls. a day of high gravity oil.

All work was carried out under the direction of Superintendent Ed Hiles and much credit is due him for the efficient way an extremely difficult problem was solved without a single injury to the crew. While the well is now under control, much hazardous rig clearing work must be done to erase the physical evidence of the mishap. A sturdy timber "doghouse" has been erected to shield the flow assembly during the difficult cleaning-up operations.

Although production is similar to that of Mission Oil Co. Pierce No. 1 to the east. the wells produce from different horizons, the Mission well flowing gas and a small amount of oil from the Zinns Zone open from 6140 to 6280 ft.

L. A. County Calls Jail Farm Bids

Spurred by leasing activity in the entire Castaic region, Los Angeles County officials are preparing to call for sealed bids on leases covering 2400 acres of county jail farm property. Located on a portion of Rancho San Francisco, some two miles north of Castaic station, the property is held to offer possibilities of petroleum accumulation.

Tentative specifications as herein outlined were drawn up at official request by Robert New of Continental Corporation, which operates county flood control leases in the Wilmington field.

Proposed Specifications

1. The entire property shall be divided into parcels of approximately 80 acres each, the alternate parcels to be designated as "A" parcels and "B" parcels. That the lease require a minimum royalty of 1/6 of the gross oil, gas and other hydro-carbon substances produced and saved from the property. The lessor shall have the right to drill upon and through the "A" parcels of this lease immediately upon execution, and payment of a minimum cash rental payable in advance of $10.00 for each and every "A" acre. The lessor shall thereafter have the right to drill upon and through the "B" parcels upon the payment of $100.00 per acre for each and every acre of "B" parcels, the said election by the lessor to avail himself of use of the "B" parcels shall be made within one year of the execution and the said $100.00 an acre for the "B" parcels to be paid as cash rental in advance at the time of such election. The lessor shall agree that, should he not elect within the said year to pay the $100 per acre for the "B" parcels, to execute forthwith and deliver to the County a good and sufficient quit-claim deed to such "B" parcels.

2. That the term of the lease be for 20 years and so long thereafter as oil, gas and other hydro-carbon substances or either of them shall be produced in paying quantities.

3. That the first well shall be spudded within 90 days from date of execution of lease and that thereafter one string of tools shall be run continuously, allowing 30 days between the completion of one well and commencement of the next.

4. That there shall be drilled not less than one well to each ten acres of the property to the zone or zones lying above 9000 feet below the surface. That there shall be drilled not less than one well to each 20 acres of the property to the zone or zones lying below 9000 feet below the surface. That there shall be drilled not less than one well to each 160 acres of the property to any zone or zones which produces only gas or less than .6 of a gallon of gasoline content.

5. No drilling within 150 feet of the main fence of the Prison Farm Buildings.

6. No drilling within 300 feet of any existing structures outside said fence.

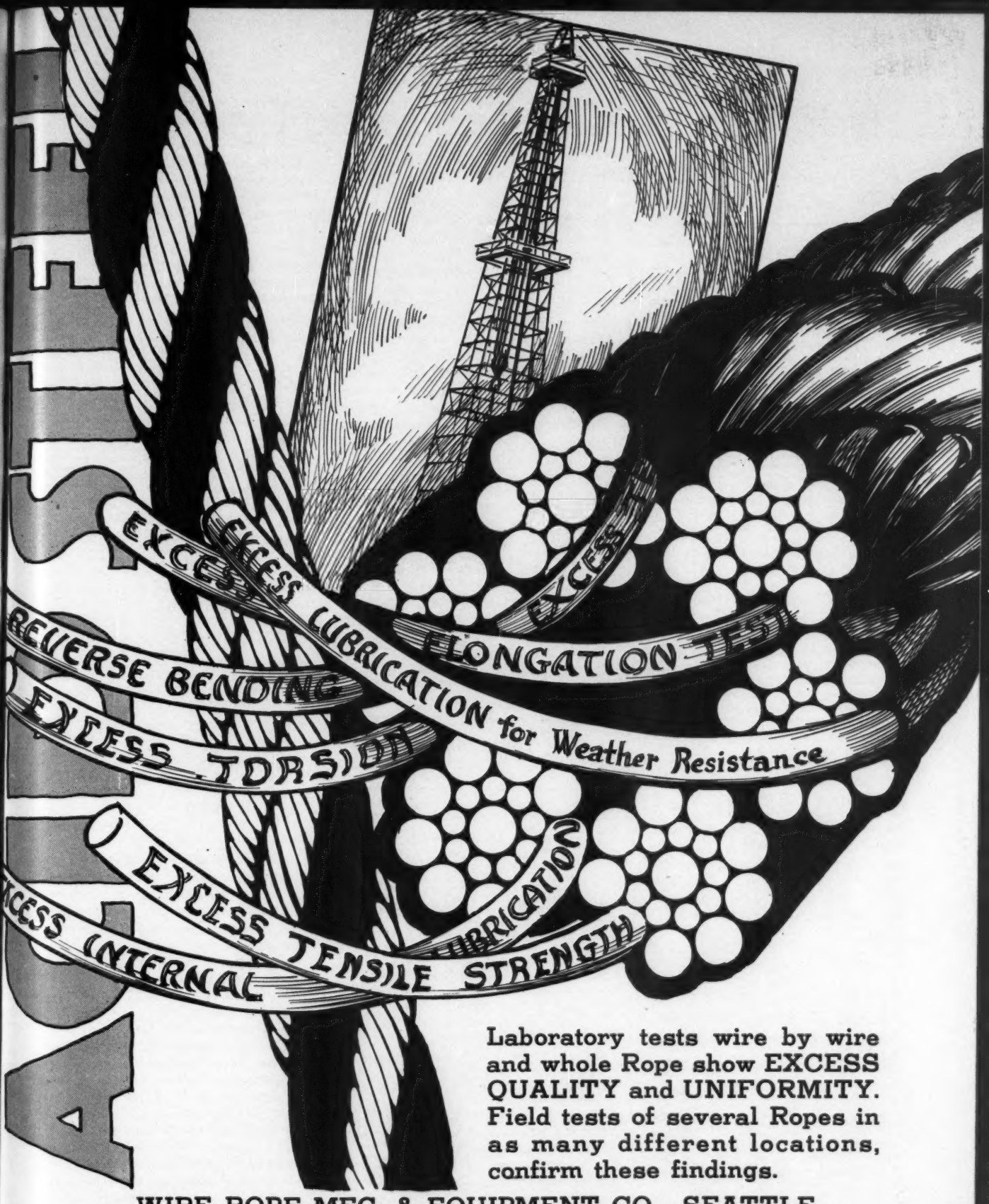
7. That the lessor shall build their own roads for heavy trucking if more than two wells are drilled.

8. That the lessor shall process, or cause to be processed for the recovery of natural gasoline, wet gas containing more than 6/10 of a gallon of natural gasoline at such time or times as the total of such wet gas produced and saved from the property shall be 2,000,000 cubic feet per day, or more, for thirty consecutive days.

9. Lessor shall have the right, at any time after the completion or abandonment of the first well, to quit-claim any or all of the property to the County, and the lessor's obligation as to such quit-claimed property shall cease.

10. Lessor may buy from county water needed in the drilling and producing of the property at rates equal to that charged by the Bureau of Water and Power of the City of Los Angeles at the nearest located water main of the Bureau, delivery to be made into the lessor's pipe line by County at County's pumping installation located on the Prison Farm.

11. Bidders shall be required to file with the Clerk of the Board of Supervisors a bond or certified check in the amount of $12,000 and that upon award of the lease to any bidder a total bond or certified check of $50,000 will be posted with the Clerk of the Board of Supervisors to insure faithful performance of the lease.



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Hydraulics of Mud Circulating Systems

Analysis of Work Done and Loss

A. P. I. 1940 Annual Meeting

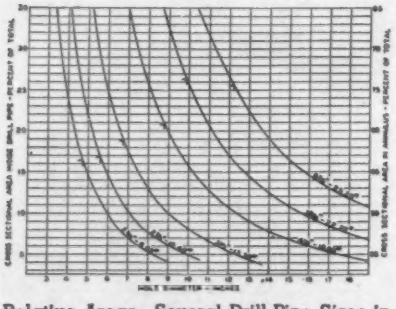
By Wesley W. Moore

ABSTRACT

This discussion does not relate to mud control nor mud conditioning, about which much already has been published. It deals rather with a preliminary analysis of the problem of circulating an average rotary-drilling mud down to and back up from the bottom of the well bore in such volume and at such velocity as effectively to remove drill cuttings from the face of the formation being contacted by the drill bit and to transport such cuttings up to the surface, where they can be deposited.

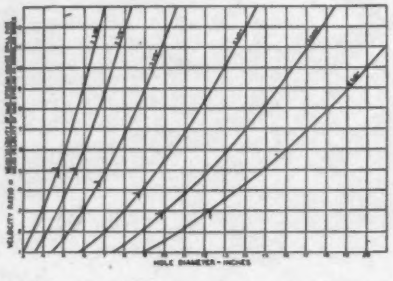
The useful work accomplished by the circulating mud stream is normally very small in relation to the energy expended. Much of the hydraulic energy, furnished by the slush pump, is consumed by friction head within the drill pipe; whereas no useful work is accomplished by the mud stream until after it has left the drill bit. In most instances the overall mechanical efficiency of the mud-circulating system can be improved by closer attention to the relationship of hole diameter, drill-pipe size, and slush-pump capacity. Included with this paper are charts and tables which it is believed may assist in analyzing the problem which here is introduced.

Mud-laden fluid, as used in the drilling of wells by the rotary method, is called on to perform numerous functions. It serves primarily, however, as a vehicle for transporting drill cuttings from the bottom of the hole up to the surface, where they can be deposited. The desired characteristics of the mud, with

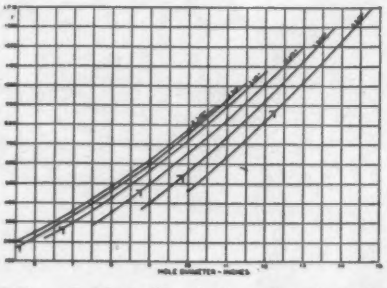


Relative Areas—Several Drill-Pipe Sizes in Holes of Various Diameters.
Fig. 1

reference to its physical and chemical properties, will be governed largely by the relative importance of the various purposes to be served at any one particular moment during a drilling operation. Although there may be what is considered an "average" mud, it cannot be stated accurately that there is a "general-purpose" mud, for the reason that characteristics most favorable for one condition may be least favorable for some other condition in the hole which occurs simultaneously. Mud control, therefore, which represents in its broader aspect a logical compromise under such varying conditions, is entirely beyond the scope of this paper. This discussion relates rather to the means of efficiently circulating an "average" mud down to, and back up from the bottom of the hole in volume adequate for effectively removing cuttings from the hole. Special reference is made to some of the factors to be considered in choosing the more favorable combinations of hole diameter, drill-pipe size, pump capacity, and prime-mover



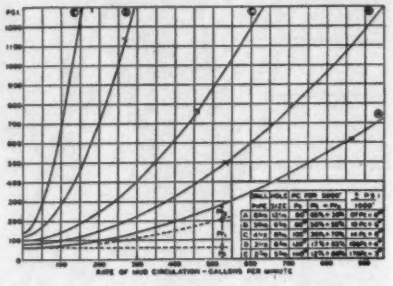
Mud-Stream Velocity Ratios for Several Drill-Pipe Sizes in Holes of Various Diameters.
Fig. 2



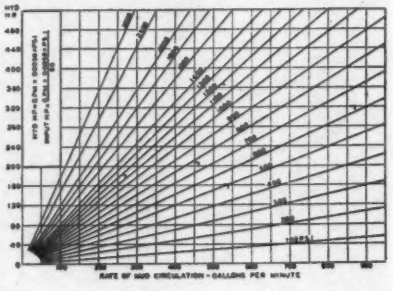
Rate of Mud Circulation Required for Velocity of 200 Ft. Per Min. in Annulus.
Fig. 3

rating to be used in drilling a hole into which a given size and length of casing is to be set.

Whereas some of the principles involved in this discussion may apply generally, these analyses refer more particularly to conditions such as are found in the greater Mid-Continent area, where formations penetrated by the drill bit are generally firm and require the more or less continuous use of so-called "rock bits." In the Mid-Continent area little or no importance can be attached to the jetting action of the high-velocity mud stream as an actual hole-making agent. Here also it is presumed generally that a rate of circulation which effectively elevates the drill cuttings will be adequate also for keeping both the bit and the bottom of the hole clean and free of debris.



Approximate Circulating Pressure (PC) for 5,000-Ft. Depth.
Fig. 4



Hydraulic Horsepower Required of Slush Pump.
Fig. 5

Experience has taught that certain combinations of drill-pipe size, hole diameter, and rate of circulation are conducive to successful and economical drilling operations. Relatively high mean velocities in the returning mud stream appear to be an important factor in this connection and, although desirable, often are limited in application by friction head developed within the mud-circulating system—particularly within the drill pipe itself. Within practical limits the friction head (or pressure drop) developed in any given mud-circulating system varies as the 1.85 power of the mean velocity of flow within the system, whereas the hydraulic-horsepower output of the slush pump, which maintains this circulation, varies as the 2.85 power of such velocity. In view of these relationships it is apparent that if the power requirements of the slush pump are to be kept within reason, and if the mean velocity of the returning mud stream also is to be kept at the desired higher rate, careful attention must be given to one important factor in the

[a] Figures refer to bibliography on p. 10.

mud-circulating system, viz., the relation of the hole diameter to drill-pipe size.

Trend in Casing Size

The rotary method of drilling first was introduced successfully into the Mid-Continent area during the development of the Seminole Field, about 15 years ago. It was the practice at that time to drill to a depth of 4,200 ft., using a 6⅝-in.-O.D. drill pipe with an 11-in. bit, and then to set 8⅝-in.-O.D. casing. Slush pumps capable of delivering approximately 600 gal. per min. soon came into general use. The inherent advantages of this program were such that mean velocities of returns could be maintained at about 200 ft. per min. with only moderate pump pressure.

In more recent years, due to economic conditions generally and due to continued search for new oil reserves at greater depths, the trend has been toward smaller sizes of casing for the production string. During the past 2 years preference for 5½-in.-O.D. casing has made rapid gains over the still-popular 7-in.O.D. size. Some operators prefer 6-in.-O.D. over 5½-in.-O.D. casing, whereas some others use as small as 4½-in-O.D. casing in certain areas. As yet we have not had sufficient experience drilling holes into which to set these smaller sizes of casing to show conclusively the most economical drilling program. Obviously the minimum size of hole for consideration is one that provides adequate clearance for running, circulating, and cementing the casing. The exact amount of clearance considered safe will vary with local conditions, and to some extent with the depth of the hole to be cased. However, it does not follow necessarily that such minimum hole size, thus determined, is likewise the most economical size to drill, unless by chance it affords also the possibility of using safely, and with sufficient clearance for fishing, some standard size of drill pipe large enough to permit circulation of sufficient mud at moderate pressures to produce the desired mean velocity of returns in the annulus.

Factors Involved

The useful work accomplished by the circulating mud stream is normally very small in relation to the energy expended. Much of the hydraulic energy supplied by the slush pump is consumed by fraction head in the flow of mud down through the drill pipe, whereas no useful work is accomplished by the mud stream until after it first has left the bit. The mechanical efficiency of the system is accordingly very low and, therefore, presents an interesting field for study. The charts herein may assist in an analysis of the various factors involved, but no final and complete answer to the problem is attempted here.

The several charts designated Fig. 1,

TABLE 1

Displacement in Gallons Per Minute—Duplex Slush Pumps

8-In. Stroke (1¼-In. Piston Rod Deducted)

Liner Size (Inches)	Revolutions Per Minute: 1	50	55	60	65	70
4	1.5742	79	87	94	102	110
4¼	1.7986	90	99	108	117	126
4½	2.0334	102	112	122	132	142
4¾	2.2882	114	126	137	148	160
5	2.5534	128	140	153	166	179
5¼	2.8322	142	156	170	184	198
5½	3.1246	156	172	188	204	219
5¾	3.4306	172	189	206	223	240
6	3.7502	187	206	225	244	262
6¼	4.0834	204	224	245	266	286
6½	4.4302	222	244	266	288	310
6¾	4.7906	240	263	289	312	335
7	5.1646	258	284	310	336	362
7¼	5.5522	278	305	333	361	389

TABLE 2

Displacement in Gallons Per Minute—Duplex Slush Pumps

10-In. Stroke (1¼-In. Piston Rod Deducted)

Liner Size (Inches)	Revolutions Per Minute: 1	50	55	60	65	70
4	1.9677	98	108	118	128	138
4¼	2.2482	112	124	135	146	157
4½	2.5418	127	140	152	165	178
4¾	2.8602	143	157	172	186	200
5	3.1917	159	175	191	207	223
5¼	3.5402	177	195	212	230	248
5½	3.9058	195	215	234	254	274
5¾	4.2882	214	236	257	278	300
6	4.6877	234	258	281	304	328
6¼	5.1042	255	281	306	332	358
6½	5.5378	277	304	332	360	388
6¾	5.9882	300	330	360	390	420
7	6.4557	323	355	387	420	453
7¼	6.9402	347	382	416	451	485

TABLE 3

Displacement in Gallons Per Minute—Duplex Slush Pumps

12-In. Stroke (2-In. Piston Rod Deducted)

Liner Size (Inches)	Revolutions Per Minute: 1	45	50	55	60	65
4	2.3088	104	115	127	138	150
4¼	2.6214	118	131	144	157	170
4½	2.9737	134	149	163	178	193
4¾	3.3558	151	168	185	202	218
5	3.7536	169	188	207	226	244
5¼	4.1718	188	209	230	250	271
5½	4.6104	208	230	253	276	299
5¾	5.0694	228	253	279	304	329
6	5.5488	250	278	305	333	361
6¼	6.0486	272	302	332	363	393
6½	6.5688	296	328	361	394	427
6¾	7.1094	316	351	386	421	455
7	7.6704	345	383	422	460	498
7¼	8.2518	372	413	454	495	536

TABLE 4

Displacement in Gallons Per Minute—Duplex Slush Pumps

14-In. Stroke (2-In. Piston Rod Deducted)

Liner Size (Inches)	Revolutions Per Minute: 1	40	45	50	55	60
4	2.6936	108	121	135	148	162
4¼	3.0583	122	138	153	168	183
4½	3.4693	139	156	173	191	208
4¾	3.9151	157	176	196	215	235
5	4.3792	175	197	219	241	263
5¼	4.8671	195	219	243	268	292
5½	5.3788	215	242	269	296	322
5¾	5.9143	236	266	296	325	355
6	6.4736	258	291	324	356	388
6¼	7.0567	282	318	353	388	424
6½	7.6636	306	345	383	421	460
6¾	8.2943	332	373	415	456	498
7	8.9488	362	407	452	497	543
7¼	9.6271	386	434	481	529	577

Note: For actual deliveries deduct 5 to 10 per cent (depending on conditions) from above figures.

TABLE 5

Displacement in Gallons Per Minute—Duplex Slush Pumps

15-In. Stroke (2¼-In. Piston Rod Deducted)

Liner Size (Inches)	Revolutions Per Minute: 1	40	45	50	55	60
4¼	3.6087	144	162	180	198	216
4½	4.0864	163	184	204	225	245
5	4.5836	183	206	229	252	275
5¼	5.1064	204	230	255	280	306
5½	5.6546	226	254	283	311	339
5¾	6.2284	249	280	311	342	374
6	6.8276	273	307	341	375	409
6¼	7.4524	298	336	373	410	447
6½	8.1026	324	365	405	445	486
6¾	8.7784	351	395	439	483	526
7	9.4796	379	426	473	520	568
7¼	10.2064	409	460	510	561	613
7½	10.9586	438	493	548	603	658
7¾	11.7364	470	528	587	645	704

TABLE 6

Displacement in Gallons Per Minute—Duplex Slush Pumps

16-In. Stroke (2¼-In. Piston Rod Deducted)

Liner Size (Inches)	Revolutions Per Minute: 1	40	45	50	55	60
4¼	3.8493	154	173	193	212	231
4½	4.3588	174	196	218	240	262
5	4.8892	195	220	244	268	293
5¼	5.4468	218	245	272	299	326
5½	6.0316	241	271	301	332	362
5¾	6.6436	265	298	332	365	398
6	7.2828	291	328	364	400	436
6¼	7.9492	318	358	398	437	476
6½	8.6428	346	389	432	475	518
6¾	9.3636	374	421	468	515	562
7	10.1116	404	455	505	555	606
7¼	10.8868	435	489	544	598	652
7½	11.6892	467	525	584	642	700
7¾	12.5188	500	563	626	688	751

TABLE 7

Displacement in Gallons Per Minute—Duplex Slush Pumps

18-In. Stroke (2¼-In. Piston Rod Deducted)

Liner Size (Inches)	Revolutions Per Minute: 1	40	45	50	55	60
4¼	4.1851	167	188	209	230	251
4½	4.7583	190	214	238	262	286
5	5.3550	214	241	268	294	321
5¼	5.9823	239	269	299	329	359
5½	6.6402	266	299	332	365	398
5¾	7.3287	294	330	367	404	440
6	8.0478	322	362	402	442	482
6¼	8.7975	352	396	440	484	528
6½	9.5778	382	430	478	526	575
6¾	10.3887	415	467	519	571	623
7	11.2302	449	505	561	618	674
7¼	12.1023	485	545	605	666	727
7½	13.0050	520	585	650	715	780
7¾	13.9383	558	627	697	766	836

TABLE 8

Displacement in Gallons Per Minute—Duplex Slush Pumps

20-In. Stroke (2¼-In. Piston Rod Deducted)

Liner Size (Inches)	Revolutions Per Minute: 1	40	45	50	55	60
4¼	4.6501	186	209	233	256	279
4½	5.2870	211	238	264	291	317
5	5.9500	238	268	297	327	357
5¼	6.6470	266	299	332	365	399
5½	7.3780	295	332	369	406	443
5¾	8.1430	325	366	407	448	488
6	8.9420	357	402	447	492	537
6¼	9.7750	390	440	489	537	586
6½	10.6420	425	479	532	585	638
6¾	11.5430	462	520	577	635	692
7	12.4780	499	561	624	686	749
7¼	13.4470	538	605	672	739	806
7½	14.4500	577	650	722	795	867
7¾	15.4870	619	696	774	851	929

Note: For actual deliveries deduct 5 to 10 per cent (depending on conditions) from above figures.

Fig. 2, Fig. 3, and Fig. 5 result from simple mathematical deductions, whereas the chart designated Fig. 4 is empirical in form and only tentative as to values shown therein.

Fig. 1 illustrates graphically some basic comparisons between cross-sectional areas inside standard sizes of drill pipe, and the annular area outside the pipe when employed in drilling holes of various diameters. For the sake of convenience each such area is expressed in per cent of total cross-sectional area of the entire hole, less that occupied by the material in the pipe. It is rather obvious that the higher the percentage of area inside the drill pipe, the more favorable such combination.

Fig. 2 shows essentially the same fundamental relationships as are shown in Fig. 1, except that in Fig. 2 the resulting mud-stream velocity inside the drill pipe is compared directly with that in the annulus. Inasmuch as the primary function of the circulating mud stream—viz., removal of cuttings from the well—is performed in the annulus, and as relatively high velocities are desirable in attaining this result, the velocity ratio as shown must be kept low in order to prevent limitation of circulation through excessive pressure drop in pumping down through the drill pipe.

Fig. 3 shows, for a large number of possible combinations of drill-pipe size and hole diameter, the rate of mud circulation, in gallons per minute, required to produce in the annulus an arbitrarily chosen mean velocity of 200 ft. per min. It will be noted that relatively minor variations in hole diameter materially affect the required rate of mud circulation.

Fig. 4 illustrates graphically the slush-pump pressures resulting from various rates of mud circulation at an assumed well depth of 5,000 ft. for the five most commonly used sizes of drill pipe, in combination with hole diameter in which perhaps they most commonly are employed. As stated hereinbefore, these curves are empirical in form and are subject to revision as to values, inasmuch as they represent conclusions of the author based only on observations and other such data as were available to him. It is believed, however, that for any given mud-circulating system used in a well-drilling operation, the resulting mud-circulating pressure may be broken down into three principal components: P_s, P_{fi}, and P_{fn}.

P_s, herein used to designate shearing pressure, is the pressure required to start the flow of drilling mud, which is not regarded as a perfect liquid, because a large proportion of solids is present. The shearing pressure varies directly as the well depth, but is apparently uninfluenced by variation in rates of circulation. The values, expressed in pounds per square inch per unit of well depth, are dependent on the physical properties of the mud and the nature of the combined flow channels. The values used in plotting curves shown in Fig. 4 are those given by Herrick[1a] for 70-lb. mud.

P_{fi}—herein used to designate pressure drop resulting from fluid friction in fixed accessories such as mud lines, hose, swivel, kelly, drill collar, and bit—is assumed to vary as the 1.85 power of velocity (or for any given circulating system, as the 1.85 power of the rate of circulation), but is otherwise constant, as these accessories do not change with well depth.

P_{fn}—herein used to designate pressure drop resulting from fluid friction within the drill pipe, through the tool-joint restrictions, and in the annulus—is assumed to vary as the 1.85 power of velocity (or rate of circulation as above), and also directly as the depth of the well.

The pounds-per-square-inch values shown for curves **A, B, C, D,** and **E** in Fig. 4, for various rates of circulation in an assumed 5,000-ft. well, are for total circulating pressure designed "P_c," wherein:

$$P_c = P_s + P_{fi} + P_{fn}.$$

Except for experiments performed by March and Gilbert,[2] there seems to be little published experimental data on which to base assignment of definite values to P_{fi} and P_{fn}. It was necessary, therefore, to consider P_{fi} and P_{fn} collectively in plotting curves shown in Fig. 4, with only a suggestive relative value for each, in order to facilitate derivation of a formula for estimating pressures at depths other than 5,000 ft. In general, curves **A, B, C, D,** and **E** have been found to be representative, and reasonably accurate, when checked against a large number of recorded observations made available to the author.

Fig. 5 shows graphically the hydraulic horsepower required of the slush pump to maintain mud circulation at various rates and at various pressure differentials.

Tables 1 to 8 inclusive, show displacement, in gallons per minute, for slush pumps of different sizes operated at various speeds, and are included herewith for the reader's convenient reference.

Conclusions

1. Results in practice, so far as they have been observed, seem to confirm the theoretical advantage of keeping the ratio of drill-pipe size to hole diameter as high as possible, and yet retain adequate clearance for fishing operations.

2. Drilling costs are influenced to some extent by the size, weight, and initial cost of the drilling equipment required for a specific operation. More efficient use of slush-pump capacity, therefore, should result indirectly in lowered drilling costs.

3. The subject, here discussed qualitatively, would seem to be of sufficient importance to warrant further and more scientific study, so that a quantitative analysis of the various factors involved could be made available to the industry generally.

Bibliography

[1] H. N. Herrick, "Flow of Drilling Mud," *Trans. Am. Inst. Mining Met. Engrs. (Petroleum Development and Technology)* 98, 476 (1932).

[2] R. A. March and W. E. Gilbert, "Resistance of Mud through Regular Vs. Full-Hole Tool Joints," *Drilling and Production Practice*, American Petroleum Institute, New York, 34 (1935).

A. R. Zelt Appointed "Oilwell" Vice President

Announcement has been made of the appointment of A. R. Zelt as vice president of the Oil Well Supply Co. in charge of manufactured products.

E. H. Roos, formerly manager of Wilson-Snyder Manufacturing Corp., succeeds Mr. Zelt as works manager of the Imperial Works Plant of the Oil Well Supply Co., Oil City, Penn.; and T. E. Regan succeeds Mr. Roos as manager of Wilson-Snyder at Braddock, Penn.

Mr. Zelt has been works manager of the Imperial Works Plant for the past ten years, and will continue his residence in Oil City where he is prominently identified with the civic and industrial life of the community. He is a native of Washington, Penn., and received his engineering degree from the Carnegie Institute of Technology at Pittsburgh, where he was active in athletics. Previous to his association with "Oilwell" Mr. Zelt was employed by the American Rolling Mill Co.

Mr. Roos, a native of Wellsville, N. Y., has already taken up his residence in Oil City. He is a graduate mechanical engineer from Ohio State University. After a short period of employment with the Moore Steam Turbine Co. of Wellsville, N. Y., Mr. Roos entered the employ of Wilson-Snyder Manufacturing Corp. seventeen years ago, and for the past ten years has been manager of the company with headquarters at Braddock, Penn.

T. E. Regan is a native of North Dakota. After being graduated as a mechanical engineer at North Dakota State College, Mr. Regan devoted some time to graduate study and research with the Westinghouse Co. He entered the Wilson-Snyder organization in 1929, has been superintendent for the past nine years, and is now elevated to manager of Wilson-Snyder Manufacturing Co. with headquarters at Braddock, Penn.

When the crude in a well is of a type which forms a stable emulsion with ordinary acid, these problems may arise: inability of the acid to attack the formation effectively, long clean-up periods after treatment and, in extreme cases, decreased production . . . The "ounce of prevention" is Howco Non-Emulsifying Acid, which does what its name implies . . . For interesting pictorial proof, see your Composite Catalog.

Development of Continuous Logging

at Rotary Drilling Wells

A. P. I. 1940
Annual Meeting

By J. T. Hayward
Barnsdall Research Corp.

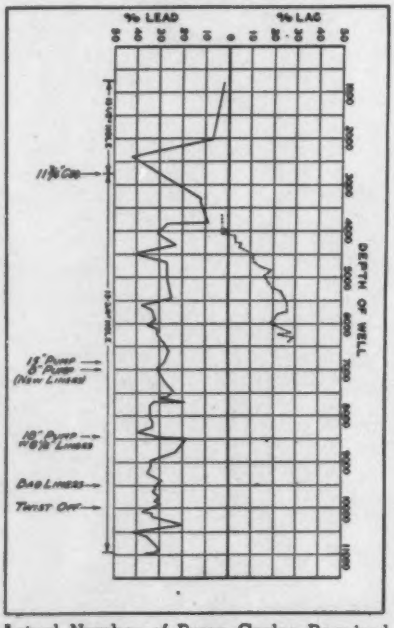
ABSTRACT

The author discusses the development of procedure and equipment now being used successfully in detecting relatively small quantities of oil, water, and gas brought to the surface from the bottom of a drilling well by mud-circulating fluid used in rotary drilling, together with the method used in determining the depths of the horizons where the samples entered the well bore.

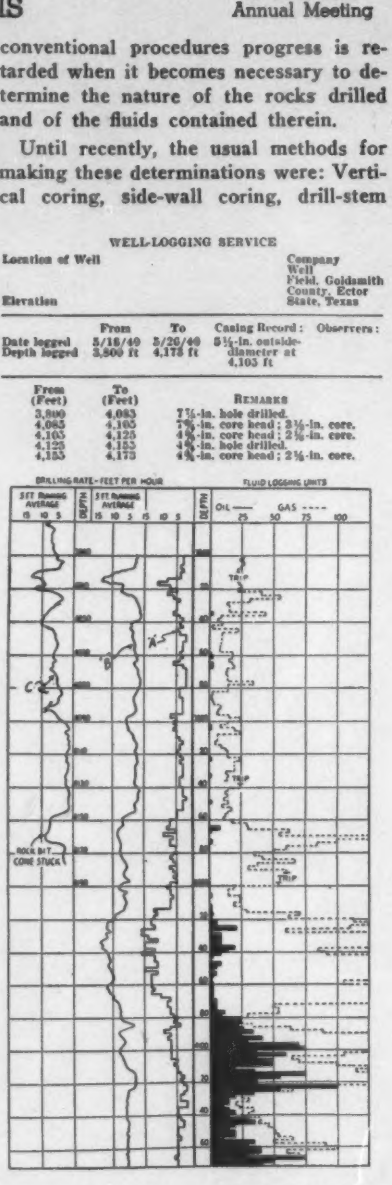
He describes in detail a number of instruments that have been placed upon a panel and installed in a trailer; the trailer is moved from location to location as the drilling rig is moved. Most of these instruments are concerned with the logging of the well as drilling progresses. With these new instruments and methods it now is possible to drill ahead continuously, and to know fairly accurately the type of formation that is being drilled through—its oil, water, and gas contents, and its depth. Information of this nature, obtainable while drilling, is quite helpful—not only in determining completion procedures, but also may become useful in the later life of the well in producing or reconditioning operations.

Modern rotary-drilling equipment can make hole remarkably rapidly, but with conventional procedures progress is retarded when it becomes necessary to determine the nature of the rocks drilled and of the fluids contained therein.

Until recently, the usual methods for making these determinations were: Vertical coring, side-wall coring, drill-stem testing, and electrical logging—all of which called for interruption in the drilling operations.



Actual Number of Pump Cycles Required to Bring Sample to Surface Compared with Calculated Number at Two Typical Wells.



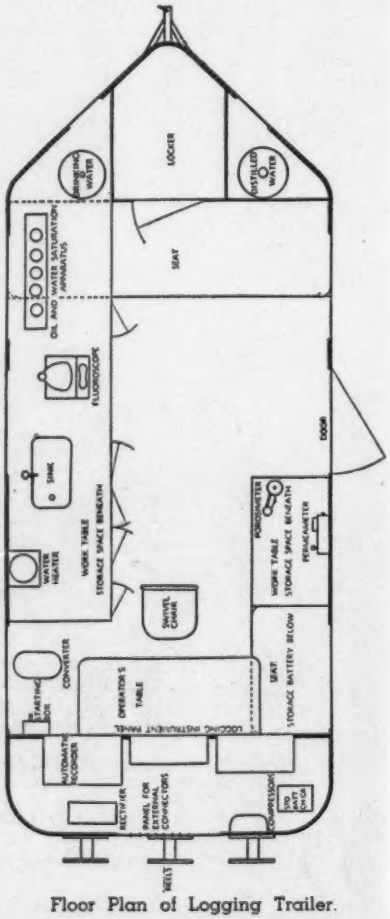
Equipment has been developed to give a continuous log of the electrical resistance of the rocks drilled, while drilling; and, considering the technical difficulties involved, remarkable progress has been made. But the system is not commercially available yet, and for this reason—and because the methods and equipment have been described adequately in another place—it is not further discussed in this paper.[38]

Cuttings (ditch samples) long have been used for logging, and no interference with drilling is entailed; but difficulties in determining the depth to which the samples refer have limited the use of the method except for rough work.

Drilling rate also has been used, but instruments capable of giving a practical record have been developed only recently.[39]

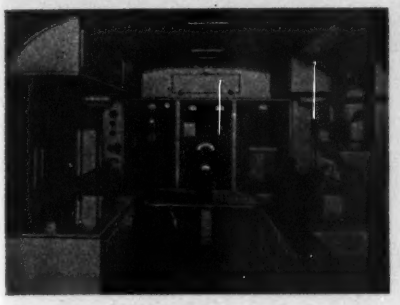
Although the collection of cuttings and the observation of the drilling rate do not interfere with the normal drilling operation, they do not furnish a complete log, because they do not supply information regarding the fluid † contents of the rocks encountered; **and it is for the fluid contents, rather than for the rock itself, that wells are drilled.**

Under modern rotary-drilling conditions the hydrostatic pressure of the drilling fluid exceeds that of the fluids in the permeable rocks drilled through, so there can be no appreciable inflow from these rocks while drilling. Actually the flow is in the opposite direction, filtrate from the water phase of the mud penetrating into the permeable formations at a rate depending upon the wall-building ability of the mud.



Floor Plan of Logging Trailer.

Superficially it appeared, therefore, that the only ways to obtain an indication or sample of the fluid content of the rock would be to take a core and bring it to the surface, drill-stem test, or electrically



Rear View, Interior of Trailer, Showing Instrument Panel, Oil Detector, and Phone to Rig Floor.

survey and deduce the nature of the occluded fluids from the electrical resistance of the rocks containing them.

It occurred to the writer that possibly the comparatively very small quantities of fluid contained in the pores of the cylindrical core of the material actually drilled and pulverized by the bit were not flushed ahead of the bit, but carried to the surface by the circulating fluid; and, further, that although—owing to the extreme dilution—the presence of these fluids could not be observed by the unaided senses, suitable instrumentation would enable detection. Both these suppositions have proved to be well founded.

For logging purposes a further condition is necessary, viz., that after detection of the fluids at the surface, it must be possible to determine the depths from which they have been derived. Procedures and apparatus for doing this with reasonable accuracy have been developed.

A combination of the information to be obtained from the changes produced in the drilling mud during its passage through the drilling zone, together with the information obtainable from the drill pipe by observing the drilling rate, the torque, the weight on the bit, and the vibration, make possible a fairly inclusive logging system that can be practiced with minimum interference with the drilling operations.

The following paper discusses the developments along these lines, with which the author has been associated.

The Circulating Fluid as a Logging Means

From the early days of rotary drilling, cuttings carried to the surface by the circulating fluid have been used for logging purposes; but a great deal of development work requires to be done before anything but a very rough log can be obtained by this means.

Before the general adoption of the shale shaker, samples were "grabbed" from the ditch in various ways, and it was uncertain whether the cuttings consisted of material picked up by the circulating fluid during its last passage through the drilling zone, or of carvings of material that had been delayed on its way up or had been carried around the system—possibly for days (but which originally had been obtained from formations many feet shallower than the depth of the well at the time of collection.) These ditch samples usually are grabbed at regular time intervals, and theoretically represent varying vertical-drilled intervals whose lengths depend upon the drilling rate. It is realized generally that there is a "lag" between the departure of the cuttings from the bottom and their arrival at the surface, and it has been customary to try to allow for this lag by using a time interval calculated according to the depth and diameter of the well. The resulting log may be very much in error.

The actual time taken for cuttings to reach the surface depends upon the rate of circulation, which varies frequently; upon the slip between the cuttings and the fluid (which varies over wide limits and depends upon the size, density, and shape of the cuttings); upon the viscosity of the mud; upon the number of collisions between the cuttings, the walls of the hole, and the drill pipe; and upon the condition of the hole.

Early tests carried out by the author indicated how unreliable could be logs based upon cuttings. In one test, which admittedly may represent extreme conditions, drilling was suspended in a 7,000-ft. well while circulation was maintained over a 6-hour period. During the latter part of the period, cuttings still were appearing on the shale shaker in large quantities, and it further was found that the nature of the cuttings could be varied by simply varying the speed of the pump.

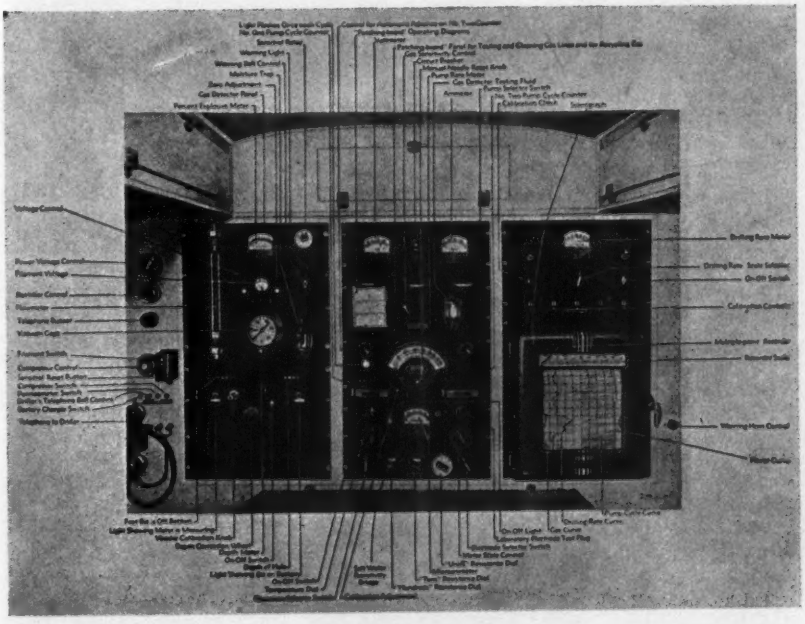
Inasmuch as logging from the cuttings is at present not a feature of the logging system with which this paper is concerned, it is not discussed further herein.

In addition to the solid cuttings, the circulating fluid carries to the surface fluids originally contained in the pore spaces of the parts of the rocks drilled up by the bit. The material actually drilled consists of a cylinder roughly equal to the bit diameter, and a length equal to the depth of the hole. Although it was known that the solids were carried to the surface, it appears to have been assumed either that the fluids were completely flushed ahead of the bit and driven back into the formation, or were present in the drilling mud in such small quantities that detection would be impossible. Early experiments by the writer demonstrated that both these assumptions were erroneous.

The following example indicates the theoretical concentration in the drilling mud of the fluids picked up by the mud during drilling, assuming that there is no flushing ahead of the bit.

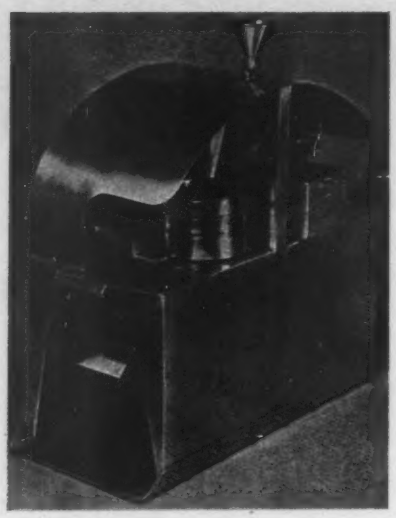
Depth of well.....6,000 ft.
Rate of circulation..800 bbl. per hour
Diameter of hole drilled.....9 in.
Porosity.....25 per cent
Rock pressure.....200 atmospheres

The volume of each lineal foot of rock drilled will be 735 cu. in., and the pore space will be 184 cu. in. If the pores



Instrument Panel.

contain an incompressible fluid and the drilling rate is 1 ft. per hour, the fluid (if all added to the drilling mud) would be transported by the mud and delivered at the surface at the rate of 184 cu. in. per hour, and the concentration in the drilling mud would be 24 ppm or ap-



Mud Sampler.

proximately 0.0024 of 1 per cent. If, in place of an incompressible fluid, the rock contains a perfect gas, when measured under surface conditions (but neglecting temperature changes) the gas would be brought to the surface at the rate of 21.3 cu. ft. per hour—which, in relation to the drilling mud, represents 1 volume in 200 or ½ of 1 per cent.

The fluids encountered during drilling are oil, gas and water. For the logging system under consideration, procedures and apparatus have been developed with which, under ideal conditions, oil can be detected in drilling mud when the concentration is only 10 ppm, and the presence of hydrocarbon gas can be detected when the rate of evolution is 2 or 3 cu. in. per hour; so that, under suitable conditions, it is possible to detect oil and gas picked up by the drilling mud from the pores of the rock drilled, even when the drilling rate is only 1 ft. per hour. The "ideal" conditions referred to seldom are met in the field; but fortunately fluid-bearing rocks usually are drilled at a greater speed than 1 ft. per hour, and the required sensitivity for detection is inversely proportional to the speed. When the fluid in the rock is water, its detection depends upon the extent of its difference in some respect to the water forming the fluid phase of the drilling mud. Because volumetric additions are obviously too small to be detected, detection must depend upon a change in the composition of the drilling fluid caused by the addition to it of the fluid contained in the pores of the core of rock drilled. Should this fluid be similar in all respects to the fluid phase of the drilling mud, its detection would be impossible. In many cases the salinity of the water in the rock is much greater than that of the drilling mud; and because, in addition, water-bearing sands are generally comparatively soft and drilled at a correspondingly high rate, the logging of these sands becomes possible.

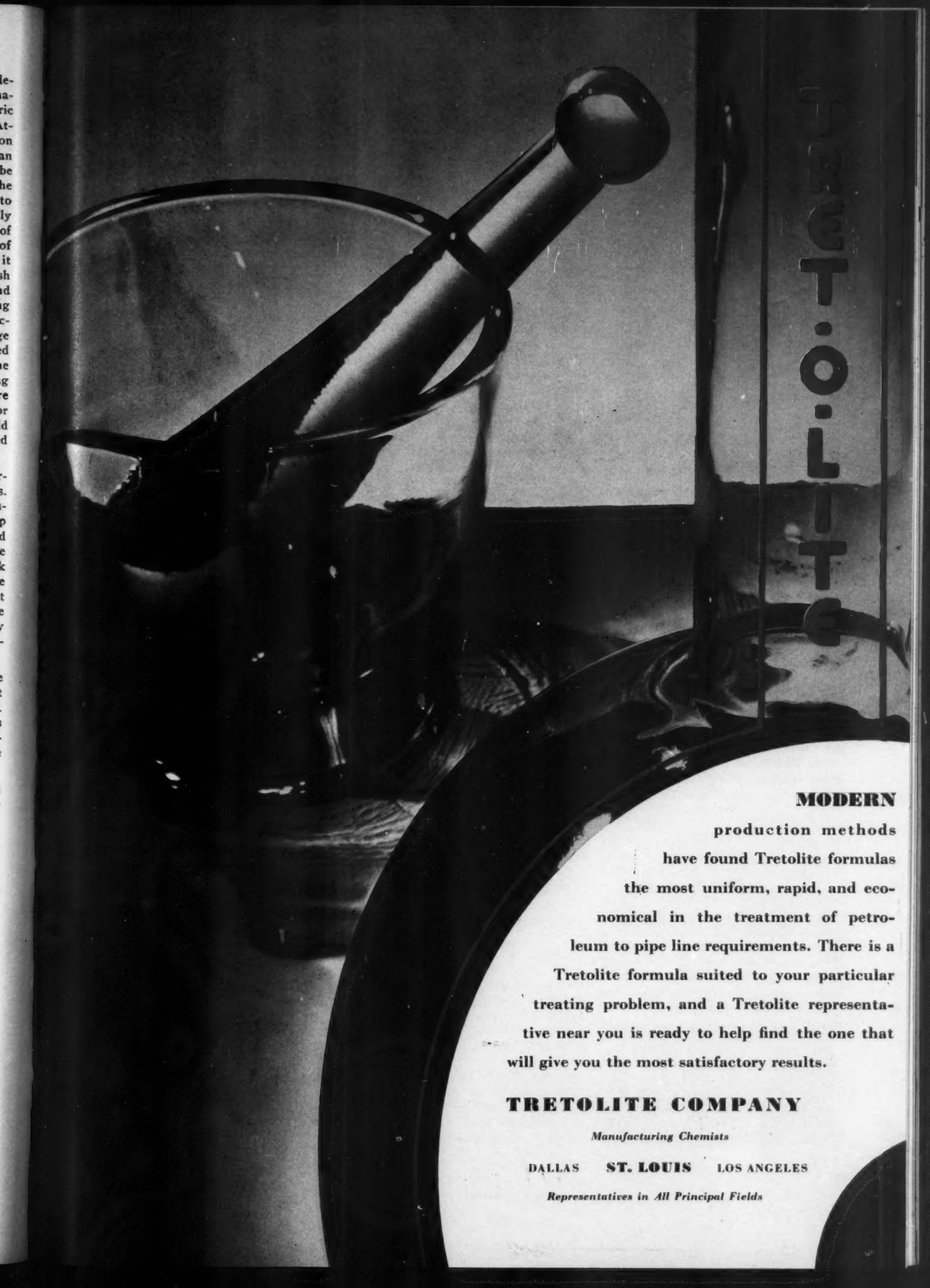
Given the possibility of logging the top of oil, gas, and water sands through the medium of changes in the circulating fluid, a further condition is necessary in order to permit the logging of the bottom of the fluid-bearing sands and their thickness, which is that there must be no inflow of corresponding magnitude from the rock or rocks already penetrated. Because, under normal drilling conditions, the hydrostatic pressure of the mud column must be higher than the formation pressures, it appears unlikely that inflow can occur. Experience has shown that in most cases this is true: that inflow does not occur, and that the bottom of the sands readily can be determined by a sharp drop in the oil, gas, or salt in the mud. Occasionally inflow is encountered; and, when encountered, it is generally from a gas sand. Curiously enough these sands from which inflow occurs are generally non-commercial and of low permeability. The author believes that in certain areas there are small, relatively impermeable sands charged at abnormally high pressures. Gas from these sands may continue to "bleed" into the hole long after the bit has passed through them; but, as experience with their behavior has been gained, it has become possible to allow for them and to log other gas-bearing horizons encountered at lower depths. The ability of the gas detector employed to distinguish between dry and wet gas, i.e., between methane and mixtures of methane and higher hydrocarbons, is of great value in this type of logging. Although inflow from these high-pressure low-volume sands is too slow to cause blowouts, it may act as the trigger and allow a lower-pressure sand of greater capacity to blow out.

In addition to the detection of fluids, logging involves the determination of the depth of the rocks from which the fluids were derived. With the logging system under consideration, the depth determination is made by two independent means: First, the drilling-rate curve—which continuously and automatically is recorded against depth—indicates the top and bottom of the sands, in many areas, by the change in drilling rate. This information is insufficient, inasmuch as it does not define gas-oil or oil-water contacts, nor does it permit certain distinction between closely spaced thin sands containing different fluids. It is supplemented, therefore, by a second determination, which depends upon the volumetric metering of the circulating fluid. Attempts to use a time interval based upon depth and diameter of the hole, and an assumed rate of circulation, proved to be extremely inconvenient owing to the bookkeeping involved, and also led to very serious errors. The method finally involves the volumetric measurement of the circulating fluid. Several kinds of meters were developed and tried, but it was found that the positive-acting slush pumps provided the most convenient and reliable means of metering the drilling mud circulated. Fortunately, great accuracy is not required, because large quantities of drilling mud are circulated per foot drilled. At a well drilling at the rate of 20 ft. per hour and circulating 800 bbl. per hour, 40 bbl. of mud are circulated per foot drilled; and an error of 40 bbl., or 5 per cent, therefore, would involve an error of 1 ft. in the logged depth.

The use of the slush pumps for metering involves the counting of the cycles. It was found that, although the volumetric efficiency varies greatly from pump to pump and with the valve settings and general condition, it does not change rapidly except when an internal leak occurs. When a leak does occur, the part involved rapidly cuts out, so that the pump operates for only a short time at the abnormal rate, and only a very short section of the log, therefore, is involved.

It is also necessary to know the volume of fluid required to displace an increment from the bottom to the top of the hole. It soon was found that the actual values differed widely from the theoretical values, and that calculations could not be relied upon.

As finally worked out, the method adopted does not require the measurement of the actual volume of fluid handled by the pump or calculation of its volumetric efficiency, and does not require the calculation of the volume in the hole. Instead, the actual number of pump strokes or cycles required to get returns is determined experimentally from time to time. This is done by placing a "tell-tale" in the drill pipe when a joint is added, and observing the number of pump strokes performed before the tell-tale is returned to the surface. Many dyes and different substances were tried out for this purpose. For instance, a few gallons of brine were put into the drill pipe, and their return in the drilling mud was picked up by resistance-measuring electrodes in the flow line. Such a tell-tale will travel several times around the system, the hump in the conductivity curve becoming flatter and wider on each trip.



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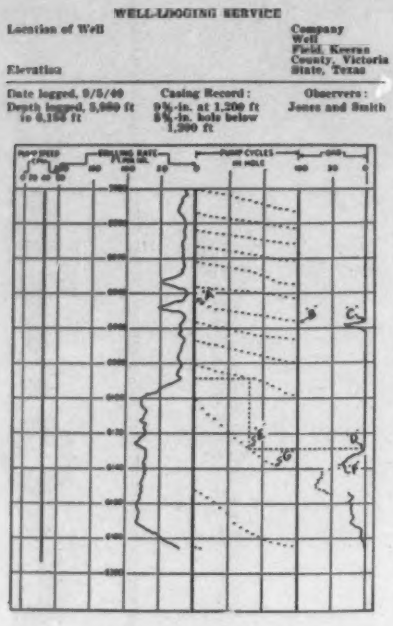

Inasmuch as salt water is one of the fluids to be detected, it is unsuitable as an indicator and, after considerable experience and many trials, common oats were adopted as the indicator. When the drill pipe is broken to add a joint, a handful of oats is dropped into the joint at the top of the hole, and the number of pump strokes required before these oats appear on the shale shaker is observed. Deducting the number of strokes required to carry the oats to the bit gives the number of strokes required to bring them from the bit to the surface. Compared with the fluid indicator, it is found that oats or any other solids take a little longer and scatter a little more—probably due to the "slip" caused by collisions with the drill pipe and the walls of the hole.

In the Gulf Coast and similar areas, where comparatively viscous muds are used, the holes are generally "fast" (sometimes by as much as 50 per cent). That is to say that returns are obtained with only half the number of strokes indicated by calculations from the displacement of the pump and the volume in the hole. This is, in one respect, fortunate, as it reduces the time lag between the drilling of a short section and the availability of the information conveyed by the mud at the surface. In other areas "slow" holes are found, and in West Texas, for instance, it is not uncommon for the observed value to be twice the calculated value.

Fig. 1 shows two typical holes, one fast and one slow.

It appears that very fast holes (i.e., 50 per cent or faster) presage stuck drill pipe, and that very slow holes accompany caved and washed-out holes and thinned mud. It is noteworthy that—even in a hole that is known to have caved—if viscous mud is used, the returns do not appear to be retarded.

Longitudinal mixing of the drilling mud is much less than might be expected, considering the agitation of the rotating drill pipe and the probable uneven nature of the walls of the hole. The extent of mixing is indicated by the dispersion or scattering of the tell-tale during its trip. In fast- and normal-time holes the scattering is small. If a handful of oats is placed in the drill pipe, three-quarters of it will return and appear on the shale shaker in a distance of 100 to 200 pump strokes, followed by some widely dispersed strays which probably have been delayed by collisions with the drill pipe and walls of the hole. In very slow holes the tell-tale return may cover 1,000 or more strokes. Fortunately, slow holes usually are found in areas where the drilling rate is slow, so that 1,000 strokes may represent only 1 ft. or 2 ft. of section drilled. At the same time, mixing lowers the concentration of the fluids to be detected in the drilling mud; but here again conditions favor detection, as oil and gas are detected more easily in the thin muds which usually accompany slow holes.

The rate at which the fluid contents of the rocks drilled are picked up by the drilling mud can be expected to depend upon the drilling rate. In any rock with a given saturation, doubling the drilling speed, therefore, should double the rate at which the fluid is picked up and delivered at the surface—so that the observed values ought to have a correction factor applied to them, based directly upon the drilling rate. With the detecting methods used at present, this appears to lead to distorted findings for oil and gas, although it may be the correct method for salt water, and the use of the square root of the drilling rate appears to give more consistent results.

The drilling rate depends to some extent upon the permeability; and inasmuch as the possible productivity also depends upon the permeability, it appears likely that, if drilling conditions could be kept reasonably constant, the shows might best be logged as they appear and without applying any correction for the drilling rate.

There is, of course, a time interval between the drilling of a rock and the arrival of the information contained by the drilling mud at the surface. As a rough general figure this amounts to 6 min. per 1,000 ft. The existence of this delay has been raised as an objection to logging by this means, but it must be remembered that the information obtained in this manner is available more quickly than it could be obtained by any other means at present commercially available. For instance, if it is not wished to drill into the sand more than, say, 10 ft., and as the returns from a 5,000-ft. hole are obtained in about half an hour, it follows that at the worst the drilling rate must be limited to 20 ft. per hour. Actually such a situation seldom occurs, as drilling is allowed to proceed without being slowed down until the proximity of an oil or gas sand is indicated by traces of gas detected by the gas indicator in the overlying rocks, or until the actual entrance into a sand has been indicated by the drilling-rate curve.

Logging with the Drill Pipe

Observation of the manner in which the rocks drill, the rate, the weight on the bit, the torque, etc., provides a means of logging their hardness or drillability. Such a log eminently is suited for correlation purposes. The information is immediately available, so that comparison can be made with similar logs from other wells while drilling is actually in progress. Logging by this method also enables the determination of the tops and bottoms of possible producing sands. Inasmuch as the comparative drillability of rocks is related closely to their permeability, the log can be used in a manner similar to that in which the self-potential or so-called "porosity curve" of an electrical survey is used, but with the important advantage over the electrical survey that the log is drawn while the well is drilling.

It is most surprising that until recently no instruments were available to log continuously the drilling rate. True, in certain areas, logs have been drawn manually by marking the kelly and noting the time required to drill successive intervals; but this is a laborious operation, requiring continuous attention, so that it has been employed only while drilling short sections of special interest—and seldom, if ever, from top to bottom of the hole.

It is probable that the dearth of development along this line was due to the commonly-held belief that the condition of the bit so would affect the record that it would be practically useless. This fear has proved to be almost entirely unfounded. It is comparative, rather than absolute, rates that convey the information; and the difference in the hardness of successive rocks is so great that a soft rock will drill much faster with a worn bit than a hard rock will with a newly-run one. Further, once a bit begins to get blunt, it rapidly deteriorates so that no great distance is drilled with it, and consequently only a small section of the log is affected. If, in addition, bit changes are noted on the log, their effect easily can be allowed for.

If, in regular drilling practice, the feed of the bit were automatically controlled, the design of an instrument to produce a drilling-rate log would be comparatively

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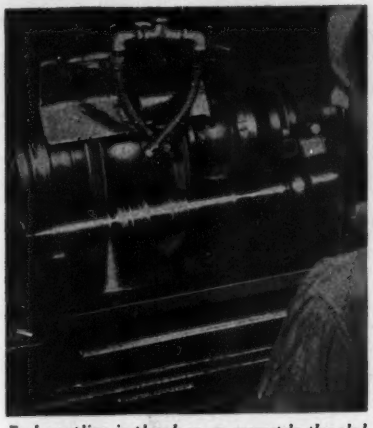

Each coupling is placed on an accurately threaded mandrel and faces are ground square with the thread, reducing the possibility of fatigue strains to a minimum.

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easy; but with manual feed the bit often is lowered in small steps, separated by longer or shorter intervals of time during which there is no movement of the feed mechanism at the surface, although the bit may be drilling off and progressing. This situation is complicated further by the human element—the rate of feed frequently varying as the driller's attention is distracted by various happenings around the rig. A graph of the "rate of feed" against "depth," therefore, often runs from extreme to extreme, is very difficult to interpret, and is almost useless for correlation purposes. This difficulty largely has been overcome by averaging, and our experience has shown that the running average is much more desirable than an average taken over consecutive intervals.

Fig. 2 shows a log of a well at which drilling rate was obtained by timing consecutive 5-ft. intervals (curve **A**). Curve **B** was drawn automatically by the instrument on the same well, and curve **C** is the automatically-drawn curve from another well in the vicinity.

The scale to be covered by a drilling-rate recorder is enormous, as the drilling rate may vary from one or two to several hundred feet per hour. This would appear to indicate a logarithmic scale, but our experience showed such a scale to be unsuitable, inasmuch as it interfered with easy correlation between logs obtained from wells drilled under slightly different conditions. Of the various scale arrangements tried up to the present, the provision of **several** scales has proved most satisfactory. The preferred ones are: 0 to 50; 0 to 100; and 0 to 500 ft. per hour—the scale actually selected depending upon conditions encountered at the well at the time. With each change of scale, it has been found desirable to change, at the same time, the interval over which the running-average speed is taken. With the 0-to-50-ft.-per-hour scale the speed logged is that at which the last 18 in. were drilled; with the 0-to-100-ft.-per-hour scale, the last 3 ft.; and with the 0-to-500-ft.-per-hour scale, either the last 3 ft. or 5 ft.—both having been tried.

Instrumentation

Sets of instruments for logging according to the method under discussion are installed in house-type trailers. Each trailer also includes equipment for core analysis and for the routine drilling mud control; but as this equipment is routine and its description is not pertinent to the scope of the present paper, it is not discussed further.

The reels at the back of the trailer carry the cables that connect the trailer to the rig power supply, and the instruments in the trailer to their control points at the rig. The instruments for logging,

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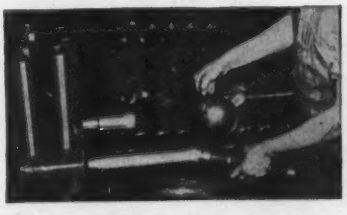

The internal diameter of each liner is checked with "GO" and "NO GO" Gages to verify correctness of machine operations.

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SELLS AND SERVICES DEEP WELL PLUNGER PUMPS AND SUCKER RODS

both by the drill pipe and the drilling mud, are grouped together on a panel across the back end of the trailer.

One of the chief difficulties met with in the instrumentation of a drilling rig is the absence, on most locations, of standard-frequency alternating current. The supply at many rigs is direct current (the voltage being far from regulated!). At others it may be high-line alternating current. The trailers have to be able to meet any condition in this respect and, therefore, contain a converter for converting direct current to alternating current, and a rectifier to supply direct current from alternating current. A 1½-kw alternating-current gasoline-driven generator also is available for jobs on which the rig supply is altogether unsatisfactory. The upper central panel is the power panel, and carries the necessary controls and instruments.

The first, and almost essential, requirement for any recording or indicating instrumentation at a well is means for continuously indicating depth, and for continuously driving a chart in synchronism with the depth of the hole. As previously explained, logged data are recorded preferably against depth in a manner similar to that in which geological logs and electrical logs are recorded, time-driven charts being entirely unsuitable.

This has been achieved for the logging system under discussion. The two counters on the left-hand lower panel continuously show the depth of the hole and the distance the bit is off bottom, while the chart in the recorder on the right is advanced longitudinally in synchronism with the depth. These operations are entirely automatic, and the instrument adds or subtracts joints of pipe as they are added or subtracted at the rig, and also distinguishes between reaming and actual drilling ahead. With the latest models the depth error is less than 6 in. per 100 ft. drilled. Means for correcting chart position every few hundred feet to bring it into agreement with drill-pipe measurements are incorporated, and the correction can be applied in a few seconds, without interrupting the operations.

The instrument on the right-hand panel, above the depth indicator, is the gas detector. A variable-speed motor-driven vacuum pump aspirates a measured quantity of air through a trap mounted on the flow line, and through a flexible hose to the trailer, where it passes through a filter, a humidifier, a flow meter, and a "hot-wire" bridge-type gas detector. There is no suitable volume meter available for covering the large range in volumes of gas that need to be dealt with in this application, nor for measuring the very small volumes met with; but the hot-wire type of instrument can detect very small volumes of combustible gas mixed with air. Readings can be obtained as little as 0.01 cu. ft. of gas per hour, with the gas detector that is used in the trailer. Using this sensitivity, it has been found in a number of areas that traces of gas can be picked up in the cap rocks overlying gas and oil sands. By this means an indication of the proximity of a possible producing sand can be obtained 10 ft. or more before the bit actually reaches the sand.

Two filaments maintained at different temperatures are used in the instrument, enabling methane to be distinguished from gas containing the higher hydrocarbons, and a distinction is made on the logs between dry- and wet-gas shows.

A core holder incorporated with the gas detector enables cores to be examined for gas, 1 or 2 cu. in. of core material being ample for the purpose.

The gas detector is connected to the recorder, and its signal quantitatively is recorded on the recorder chart.

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To be concluded in the Second Issue December

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L A U G H T H I S O F F

According to **Drexler Dana,** the only sure way to get on a line that isn't busy these days is to go fishing.

On the same subject, we might mention that when television becomes an actuality, wrong numbers will probably be quite popular.

Whereupon, **Oliver Field,** the noted ornithologist tells us about a Boston lad who recently visited a farm, and for the first time in his life saw some ducks. "My," he exclaimed, "Don't they have large Williams."

Which recalls Junior's classic announcement to the effect that he had seen a peacock in full bloom.

And one of the finest juvenile expositions of bird lore we have ever run across is the following outburst by a local school boy: "Geese are low heavy birds, which are mostly meat and feathers. Geese can't sing on account of the water is so damp. They ain't got no between their toes, but have a little balloon to keep them from sinking. Some geese has big curls on their tails and is called ganders. Ganders don't have to set and hatch, but just eat and loaf around and swim. If I was a goose I would rather be a gander."

L. G. Hayworth next opines that there will never be any peace in this world until we beat our swords into ploughshares, and our hit-and-run drivers into insensibility.

Speaking of accidents, **Kenneth Cook** asked a recent victim if he could give any details of the happening. "Oh sure," was the reply. "There was a loud bang, and then I don't remember any more."

Kenny, by the way, although one of the best platform orators in the industry, still believes the most enjoyable after-dinner speech is that old reliable, "Well, boys, this is on me."

Now arises **J. B. Washburn,** after a long silence, pointing out that the best way to keep ale from souring is to drink it.

And when the waiter arrived the rousty knew that his sour had come.

You have, of course, heard about the chap who went to the door, marked "Families Supplied Here," and tried to purchase a wife and three children.

Also, when the oil man disdainfully told his wife that a woman who would stoop to go through her husband's pockets was lower than a liner, the lady in question immediately retorted, "Well, if you'd only hang up your clothes I wouldn't have to stoop."

Continuing on the general topic of man's clothes, a Santa Fe Springs pumper went into Los Angeles for a lid a short time ago. "What do you say to a Homberg?" asked the clerk, and our friend squawked, testily, "Naw. I don't want nuthin' to eat. Show me some hats."

On the same subject, **Gene Powell** recites the weird story about an oil executive who took a trip back east and found the weather anything but balmy. When he returned home, much to the amusement of his friends, he appeared to be wearing a pair of spats. The laugh was on them, however, they weren't spats at all—just his new long underwear.

And **Don Riley** swears that a petroleum engineer of his acquaintance has adopted a new system of home conduct, called the N.R.A.—no relatives allowed.

The N.R.A., in case you don't remember, was a blue eagle that laid a china egg.

Relatives, on the other hand, are just people who wonder how the heck you ever get by.

All of which goes to prove once again that beauty parlor operators are by no means the only ones who are crazy enough to make up a bunch of jokes.

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- ★ **Bottlenecking for Cement Jobs**
- ★ **Cleaning-Up Oil Sands**
- ★ **Straightening Crooked Holes**
- ★ **Setting Liners**
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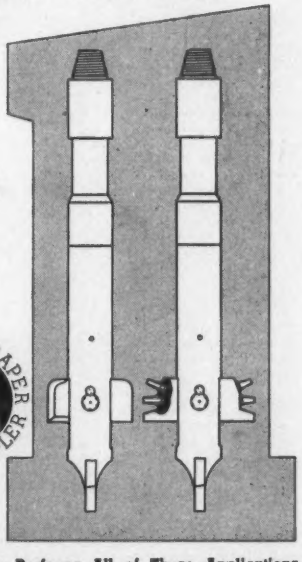

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Production « « » » Development

(Figures of Production and Stocks are in barrels of 42 Gals.)

	Total Production October	—DAILY AVERAGE— Oct., 1940	Sept., 1940	Oct., 1939
Group No. 1				
Arvin	39,091	1,261	1,461	2,056
Belridge—North	310,872	10,028	10,030	11,864
Belridge—South	66,808	2,155	2,143	1,163
Canal	161,855	5,221	5,263	5,854
Canfield Ranch	1,204	39	32	86
Coalinga	926,332	29,882	28,596	20,805
Cole's Levee	112,773	3,638	3,442	1,631
Edison	68,907	2,223	2,308	2,244
Elk Hills	373,717	12,055	12,107	10,155
Fruitvale	166,108	5,358	5,726	6,115
Greeley	136,526	4,404	4,547	2,611
Kern River	328,629	10,601	10,884	11,462
Kettleman Middle Dome	.....	.....	.....	2
Kettleman North Dome	1,328,032	42,840	46,985	52,042
Lost Hills	109,559	3,534	3,712	3,572
McKittrick	114,948	3,708	3,586	3,620
Midway-Sunset	1,469,113	47,391	48,758	48,653
Mountain View	189,271	6,105	6,305	7,657
Mount Poso	275,349	8,882	9,345	10,866
Paloma	14,222	459	487	221
Rio Bravo	341,218	11,007	9,788	7,844
Round Mountain	229,078	7,390	7,168	80,40
Strand	42,356	1,366	1,471	727
Ten Section	327,482	10,564	10,133	8,561
Tupman	206,650	6,666	5,541	506
Wasco	54,177	1,748	1,849	1,335
Wheeler	9,633	311	305	332
Group No. 2				
Capitan	48,951	1,579	1,629	2,230
Elwood	100,239	3,234	3,267	4,122
Rincon	153,177	4,941	5,000	3,737
San Miguelito	100,507	3,242	3,178	2,801
Santa Barbara	6,900	222	210	299
Santa Maria	222,910	7,191	5,791	8,202
Santa Maria Valley	621,685	20,054	19,590	9,516
Summerland	699	23	25	24
Ventura Avenue	1,049,296	33,848	33,118	36,392
Ventura-Newhall	250,790	8,090	7,987	7,095
Watsonville	775	25	25	30
Group No. 3				
Brea-Olinda	170,122	5,488	5,527	5,790
Coyote—East	118,091	3,809	3,723	2,586
Coyote—West	251,861	8,125	6,891	10,038
Domingues	677,018	21,839	21,723	18,396
El Segundo	55,580	1,793	1,808	2,901
Huntington Beach	801,204	25,845	26,332	26,802
Inglewood	345,137	11,134	11,384	13,008
Lawndale	1,315	43	49	48
Long Beach	1,332,719	42,991	43,493	45,140
Los Angeles-Salt Lake	16,890	545	554	527
Montebello	520,659	16,795	16,954	26,047
Playa Del Rey	119,607	3,858	4,065	4,580
Potrero	67,997	2,193	2,135	1,221
Richfield	277,161	8,941	9,038	8,670
Rosecrans	411,852	13,286	13,008	10,631
Santa Fe Springs	789,625	25,472	25,285	26,626
Seal Beach	204,325	6,591	6,457	7,144
Torrance	304,982	9,838	9,942	14,219
Whittier	5,994	193	200	976
Wilmington	2,506,105	80,842	82,280	86,170
Total	18,938,092	610,906	612,600	616,091
September	18,378,003	612,600		
Decrease (*Increase)	560,089*	1,694		

	New Rigs Up	Active Drilling	Producers Completed	Daily Initial Output	Active Producing	Abandoned Wells Drillers	Abandoned Wells Producers
Group No. 1							
Arvin	..	..	....	....	15	....	1
Belridge—North	2	2	2	185	71	....	....
Belridge—South	..	....	....	....	189	....	....
Canal	..	1	1	168	34	....	....
Canfield Ranch	..	....	....	....	1	....	....
Coalinga	7	20	14	23,642	907	....	2
Cole's Levee	2	9	....	....	27	....	....
Edison	1	1	....	....	96	....	....
Elk Hills	..	....	....	....	193	....	....
Fruitvale	..	....	....	....	170	....	....
Greeley	2	6	1	5,228	35	....	....
Kern River	..	1	....	....	1,547	....	1
Kettleman North Dome	1	8	3	3,584	273	....	1
Lost Hills	1	1	....	....	271	....	....
McKittrick	1	....	....	....	203	....	....
Midway-Sunset	2	4	1	274	2,546	....	6
Mountain View	..	....	....	....	177	....	7
Mount Poso	..	1	....	....	284	1	....
Paloma	2	2	1	1,346	4	....	....
Rio Bravo	3	6	5	7,712	68	....	....
Round Mountain	1	2	....	....	225	1	....
Strand	..	1	....	....	8	....	....
Ten Section	5	4	5	9,570	63	....	....
Tupman	4	10	8	9,787	36	....	....
Wasco	1	2	....	....	12	....	....
Wheeler Ridge	..	1	....	....	34	....	....
Group No. 2							
Capitan	1	1	....	....	42	....	....
Elwood	..	....	....	....	74	....	....
Rincon	1	2	1	100	67	....	1
San Miguelito	1	2	1	335	25	....	....
Santa Barbara	1	....	....	....	19	....	....
Santa Maria	1	1	....	....	179	1	....
Santa Maria Valley	1	2	....	....	140	....	....
Summerland	..	....	....	....	8	....	....
Ventura Avenue	3	9	4	3,302	323	....	1
Ventura-Newhall	7	16	3	2,800	530	1	....
Watsonville	..	....	....	....	7	....	....
Group No. 3							
Brea-Olinda	..	1	....	....	359	....	....
Coyote—East	1	3	4	1,228	88	....	....
Coyote—West	..	....	....	....	62	....	....
Domingues	4	3	1	817	193	....	....
El Segundo	..	....	....	....	41	....	2
Huntington Beach	4	4	4	3,025	538	....	....
Inglewood	3	1	....	....	193	....	....
Lawndale	..	....	....	....	5	....	....
Long Beach	2	3	3	920	1,213	....	6
Los Angeles-Salt Lake	..	....	....	....	103	....	....
Montebello	..	1	....	....	332	....	....
Playa Del Rey	..	....	....	....	150	....	2
Potrero	2	2	....	....	20	....	....
Richfield	..	....	2	97	306	....	....
Rosecrans	3	5	3	2,425	166	....	....
Santa Fe Springs	..	....	....	....	587	....	2
Seal Beach	1	1	....	....	119	....	1
Torrance	..	....	....	....	640	....	14
Whittier	..	....	....	....	38	1	....
Wilmington	9	11	10	3,308	888	....	....
Miscellaneous Drilling	4	27	....	....	....	4	....
Group No. 4—Gas Fields							
Buena Vista Lake	..	....	....	....	3	....	....
Buttonwillow	..	....	....	....	17	....	....
Chowchilla	..	....	....	....	....	....	....
Delano	..	....	....	....	16	....	....
Fairfield Knolls	..	....	....	....	....	....	....
Goleta	..	....	....	....	....	....	....
Marysville Buttes	..	....	....	....	3	....	....
McDonald Island	..	....	....	....	5	....	....
Rio Vista	..	....	1	Gas	23	....	....
Semi-Tropic	..	....	....	....	....	....	....
Tracy	..	....	....	....	4	....	....
October	84	177	78	79,853	15,015	9	47
September	90	171	62	41,382	14,933	13	12
Increase (*Decrease)	6*	6	16	38,471	82	4*	35

SUMMARY OF CALIFORNIA OILFIELD OPERATIONS FOR OCTOBER, 1940—STOCKS HELD IN PACIFIC COAST TERRITORY BY CALIFORNIA OIL COMPANIES

	Oct. 31, 1940	Sept. 30, 1940	October Changes	Oct. 31, 1939
1. Gasoline-Bearing Crude	35,292,981	35,367,172	— 74,191	35,413,920
2. Non-Gasoline-Bearing Crude	12,351,317	12,584,562	— 233,245	14,065,553
3. Unblended Nat. Gas	2,619,397	2,752,640	— 133,243	1,889,973
4. Gasoline (not including distributing and service stations)	14,274,663	14,532,495	— 257,832	14,338,180
5. Naphtha Distillates	1,766,386[1]	1,865,261[1]	— 98,875	1,263,943[1]
6. Gas Oil and Diesel Oil	10,621,124	10,622,136	— 1,012	9,974,159
7. Fuel Oil Residuum	61,777,967	62,840,120	—1,062,153	68,655,549
8. All Other Stocks	8,738,807[2]	8,731,693[2]	+ 7,114	7,659,247[2]
TOTAL	147,442,642	149,296,079	—1,853,437	153,260,533
[1]Estimated amount of unfinished gasoline in item 5	1,585,704	1,693,753		1,018,615
[2]Coke included in item 8	1,035,784	1,103,750		730,298

Nomads Open Spanish Classes in L. A.

Schedule Golf Tourney Dec. 27

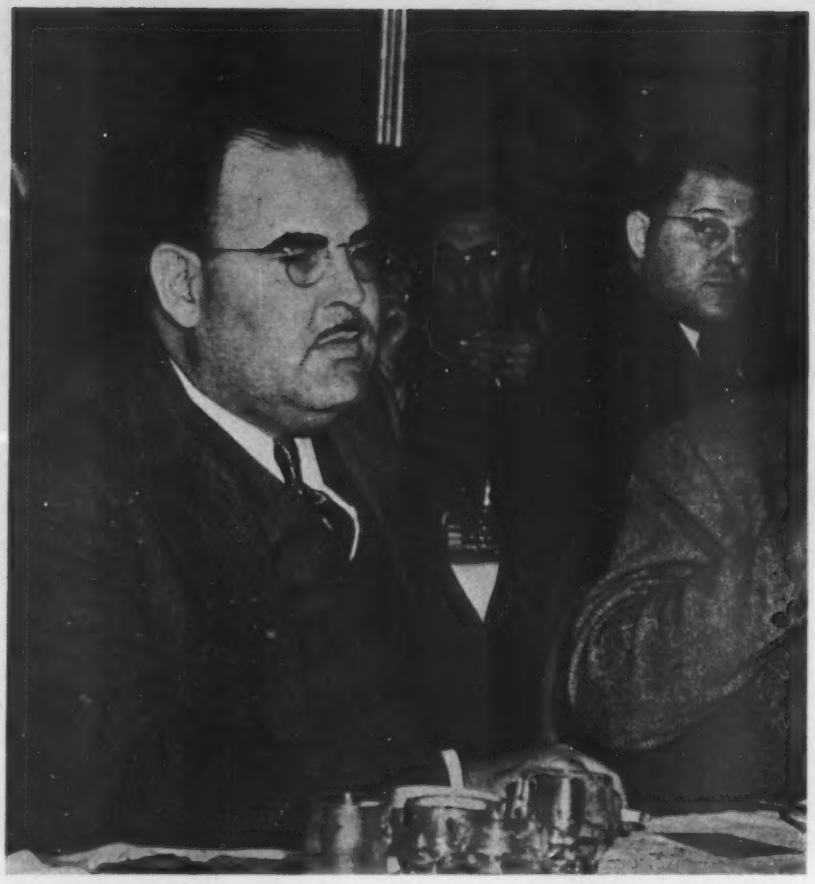
The November meeting of the Los Angeles Chapter of Nomads was held at the Mayfair Hotel in Los Angeles, Nov. 27. The speaker for the evening was John (Beans) Reardon, umpire for the National League who gave an interesting discussion on base ball in the big leagues and the personalities of base ball players. This was a surprise entertainment and being followed by questions fired at Mr. Reardon, finally had to be called off because of lateness of the hour.

Arrangements for a Spanish class to be held weekly in the Baker Oil Tool, Inc. auditorium were completed and the first lesson for Nomads was held Dec. 4.

Among the guests from other countries in attendance at the November meeting were Phil Aswerus, formerly with Standard of California in Egypt; Erno Bonebakker of B.P.M.; John C. Bergman with V.O.C. in Venezuela; Mike Bush of Bahrein Petroleum; J. S. Campbell of U.B.O.T. from Trinidad; J. W. Cune of V.O.C. from Venezuela; A. T. Gano of Cia. de Patroleo, Shell de Colombia, from Colombia; Claude H. Goff of U.B.O.T. from Trinidad; A. J. deJager, of B.P.M. from Borneo; Harvey M. Lytel of Socony Vacuum, Egypt; Robert McKean of Caribbean Petroleum from Venezuela; Paulo B. Sardinha of Drilling and Exploration Co. from Brazil; Claude Speer of B.O.C. from Venezuela; and E. L. M. Trafford of B.P.M.

Pausing a moment over the Nomad coffee for the photographer are Harvey Lytell, Socony-Vacuum, Egypt; Larry Coker, A. E. Witt, and R. R. "Dick" Smith, all of National Supply.

Nomad festators were Paulo B. Sardinha, G.N.P., Brazil; E. L. M. Trafford, B.P.M.; Don Grable, now on special assignments with Drilling Exploration Co.; "Slim" Taylor, Drilling Exploration, and Earl Boggess, Baker Oil Tool.



Enjoying the Nomad program was A. T. "Tiny" Gano, Shell of Colombia; Clarence Hill, Oil Well Supply, and "Monty" Montrose, Lane Wells.

With Nomad Roy Hitchcock, left, came John Wilson, who supplies Roy's H & B Sales Co. with those mechanical rigs you hear so much about.

Golf Tournament Dec. 27

Nomads and guests are holding their annual golf tournament Dec. 27, at the California Country Club. The tournament is in charge of a committee composed of Ernie Fowks, George Anderson and Hi Cassidy, who in turn will be assisted by R. J. Eiche, Geo. W. Walton, Earl Rees and L. G. Trembly. Nomads are meeting at the club for lunch at twelve o'clock sharp and will tee off at one. Play will be 18 holes with first prize to the low gross winner and prizes for the first low net, the second low net and a booby prize. This will apply to the Nomad members and there will be in addition first and second low net and booby prizes awarded to oil company guests. After the tournament a dinner is scheduled at six-thirty, to be followed by entertainment. Those planning to play should either write or phone Ernie Fowks at the Emsco Derrick and Equipment Co., as soon as possible. Cost for Nomads will be $1.00 greens fee and $1.50 for dinner. Oil company representatives from foreign fields are to be guests of the Nomad chapter. This is the first golf tournament to be held by the Los Angeles Chapter of Nomads, and if it is enjoyed as much as was their first barbecue, which was given not long ago, it will certainly be a success.

"Tex" Harvey Testing San Luis County Well

With bottom in hard black shale which is probably the lower member of the Monterey, "Tex" Harvey Oil Co. is making a production test in Gilmore Comm. No. 1. Located in sec. 11,32-14, in Huasna Valley, the well drilled to 4518 ft. and is believed to have penetrated to a greater stratigraphic depth than other wells in the area because formations at the surface appear to be well down in the Miocene section.

For the present test, casing was cemented at 3520 ft. blanking off the brown shale which produced small quantities of heavy oil in neighboring projects and leaving open the several intervals in the black shale section which showed some promise of lighter oil saturation. Frequent runs of a tester during drilling indicate that the formation has very little "give" and that several days of washing, bailing and swabbing will be required to prove the productive possibilities of the hole.

Strictly a wildcat in every sense, Gilmore Comm. No. 1 was started as a Vaqueros test but at present depth has not reached the top of the Temblor. Should the current effort fail to develop production, the company may pull the liner and resume drilling.

Foursome left above: Ray Hayes, Earl Neitzel, A. H. Arnold, and David Will, won low gross and the foursome at right: E. S. Palmatier, A. C. Reab, Jim Finley, and F. H. Podmore, won low net in first flight, in Richfield Oil Corp.'s tournament.

Jimmy Crosby came up with a hole in one.

Richfield Golfers End Successful Year

Richfield Oil Corp. golfers closed a highly successful season Saturday, Dec. 7, competing on the Baldwin Hills course for permanent possession of trophies in three different classes.

The HIXON-O'DONNELL AWARD for low gross was won by Earl Neitzel with a neat 76 while A. C. Reab, for low net in the first flight, took the handsome PRESIDENT'S CUP donated by Charles S. Jones, Richfield's chief executive. The CALIFORNIA OIL WORLD TROPHY for second flight low net went to C. E. Axtel.

Crowding the winners for the center of the spotlight was Jimmy Crosby whose hole in one nearly stole the show.

W. C. Whaley Elected Barnsdall Oil Co. Director

W. C. Whaley was elected to the directorate of the Barnsdall Oil Co. at the last regular meeting of the Board.

Mr. Whaley entered the service of the Barnsdall Oil Co. in 1924 working in the capacity of driller on Barnsdall's Rosecrans No. 1, discovery well in the Rosecrans field. His promotions have included the positions of drilling foreman, field superintendent, general superintendent, and in 1931 he was elected to the vice presidency of the company. His splendid achievement in this capacity won for him a host of friends in the industry as well as a reputation for loyalty to his company, and unswerving devotion to his task. In recognition for his splendid services, and as a tribute to his ability and hard work, the Board of Directors have now honored him with a directorship.

W. C. Whaley is now a Barnsdall director.

Jack Walton Retires From Emsco Organization

After being in harness intensively and continuously for about twenty years, Geo. W. (Jack) Walton, native Texan and widely known throughout the petroleum industry, is taking a long planned and much needed vacation from business during the next few months.

Jack is one of the best known men in the oil equipment business, having joined up with the Transcontinental Oil Co. as purchasing agent shortly after serving in the air service during the world war. Previous to his war service he was in business in the Joplin mining district being a graduate of the Missouri School of Mines.

After leaving Transcontinental, Jack was with the National Supply Co. for five years, a portion of the time in Europe with headquarters in London. Later he

George W. "Jack" Walton

joined Wilson-Snyder Manufacturing Co. and was largely responsible for that organizations entering into the manufacture of slush pumps.

For nearly fifteen years he has been connected with Emsco Derrick & Equipment Co., serving in many capacities, during recent years as vice president and sales manager.

He is an active member of the Los Angeles Chapter of Nomads, the well known club of supply men. who have travelled abroad.

Jack states he has several propositions under consideration for the future, all of which are in the oil equipment industry, of course. But first . . . that well earned vacation and rest. And here is the very best of luck to you Jack Walton.

You are reading the Pacific Coast oil men's home paper.

Walter English

Wayne Loel

Here's to straightening up a scramble of titles and pictures in the Second Issue November coverage of the A.A.P.G. Meeting in Los Angeles.

Tide Water Finishes Eleventh Aliso Well

Successful completion of Porter No. 24 in the Aliso Canyon field was accomplished recently by Tide Water Associated Oil Co. at a total depth of 5365 ft. On a 24 hour test, production was 1182 bbls. of 22.3 gravity oil with a 1.0% cut from the Porter No. 1 zone. Daily gas potential was set at 280,000 cu. ft.

This was the eleventh producer for the company since its discovery of the field in October, 1938. Aliso Canyon lies approximately ten miles northwest of San Fernando.

Officials of Tide Water Associated Oil Co. state that construction of a five mile pipe line from the field is contemplated in the immediate future. The line will be of 8 in. pipe and will link the company's producing wells to existing trunk lines for transportation of the oil to refineries and marine terminals.

The new line, which will cost approximately $150,000, is expected to require about two months to complete. At the same time erection of storage tanks capable of handling 100,000 bbls. will be undertaken at the field. An electric pumping station will be built to ship the crude through the line which will displace the present trucking operations.

Fullerton Finds New Whittier Field

What appears to be a new accumulation along the Whittier fault was discovered by Fullerton Oil Co.'s No. 6 in the southeast corner of sec. 25,2-11 about a mile southeast of production in the old Whittier field. Drilled to 6000 ft., the hole was plugged to 2940 ft. where, with 220 ft. open, a test showed a gas yield of 8,000,000 cu. ft. Casing was then perforated near the 2200 ft. level where tests showed the presence of gas and oil. Last reports indicated the well was producing about 20 bbls. of oil and an unestimated amount of gas.

British drillers have struck oil at Downholland Moss in Lancashire.

Field Development

Los Angeles Basin

15 Strings Drill Wilmington Field

With 15 strings of tools running, activity continues to hold up well in the Wilmington field. Development work is distributed generally throughout the field with the greatest concentration in the northwest end where several wells have just been completed and locations are being prepared for others.

Of wells now drilling, about an equal number is headed for each of the four main producing horizons, there being at present a mild revival of interest in the Ford Zone.

Recent completions have not been sensational but, on the whole, have been satisfactory as shown by the following examples:

Leslie Madison's Kern No. 2, at Denni and Island, was finished on the pump for 195 bbls. from 3716 ft. Martin-Miller Oil Co.'s P. M. No. 13, north of the same intersection, flowed 250 bbls. while C. M. Morse's Avalon No. 1, located north of "N" St., flowed 150 bbls. In the old town lot area at Anaheim and Banning, Sonwell Oil Co. redrilled No. 1 obtaining a 260 bbl. flow.

Hellman To Drill Seal Beach Outpost

The Hellman Estate Co. has skidded in a derrick for a new outpost well, No. 6, at the east end of the Seal Beach field. A deep test is not contemplated, production being sought in the established zones.

Continental Oil Co., only other active operator in the area, is drilling Bixby No. 45 near the 4250 ft. level.

New Group Enters East Coyote Field

First new company in some time to enter the Master section of the East Coyote field is Adco Petroleum which is starting work in the southwest corner of the Basten lease. The new derrick is located close to the center of the area which has been active during the past year and should make a well in either the upper Anaheim zone or the deeper Lemke horizon.

In the southerly portion of the area, Harrison M. Tucker plans to drill his No. 2 well on the Kenneth Wright property where Master Petroleum Co. drilled a deep test which was unsuccessful below the Lemke.

Extending deep zone production farther to the west, Union Oil Co. is pre-

LOS ANGELES BASIN WILDCATS

Area	Well	No.	Section	Depth	Status
Athens	Rankin & Williams	1	7, 3-13	7035	Drilling
Castaic	Colter, R. T., Explor.	1	8, 4-17	1338	Idle
	Havenstrite, R. E., Lincoln	2	16, 4-17	5749	Drilling
	Pedro Pet. Co., Oates	1	24, 5-17	2205	Idle
	Western Gulf Oil Co., Lechler	1	31, 5-17		Rig
	Worland Oil Co., Jenkins-Owens	1	18, 5-16	2950	Drilling
Domingues, West	Wood-Mellon Oil Co., Wood	1	31, 3-13	7498	Rig pump
La Habra	Fullerton Oil Co.	6	25, 2-11	6006	Testing
Mint Canyon	Redwood Oil Co., Mitchell	2	22, 4-15	1580	Idle
Malibu	Sovereign Oil Corp., Sovereign-Marblehead	1	7, 2-18	3469	Idle
Monterey Park	United Petroleum Co., Haig	1	26, 1-12	3370	Cleaning out
Newhall	Canyon Oil Co., Sanborn	1	6, 3-16		Rig
	Creighton Hammon Synd., C. H.	1	17, 3-16	990	Idle
	Lee, Wm. Y., Irene	1	31, 4-15	300	Drilling
Palos Verdes	Rolling Hills Pet.	1	27 4-14	6580	Idle
Redondo	Calif. Oil & Ref. Co. Cal-o	1	18, 4-14		Location
Torrance-Wilmington	Silver Pet. Co.	1	30, 4-13	1525	Drilling
	Bristol Oil Co., Spring	1	30, 4-13		Location
San Fernando	Casa Grande Oil Co., Lopez-Lundy	1	1, 2-15	3785	Idle
West Whittier	Cal. Pico Oil Co., Beach	1	7, 2-11	7788	Idle
	Orange County				
Costa Mesa	Thompson, Milton N., Banning	1	9, 6-10	5649	Idle
	San Bernardino County				
Carbon Canyon	Earp, H. R., Kraemer-Backs	1	34, 2-8	1352	Idle
	May, Homer, Oasis	1	31, 2-8		Rig

NORTHERN COUNTIES WILDCATS

County	Well	No.	Section	Depth	Status
Madrea	Blake, T. N., Arnold	1	22, 10-17	3204	Idle
Merced	Don Pedro Oil Co.	1	9, 6s-9e	1906	Idle
Monterey	Loma Grande Oil Co., Corey	1	23, 24s-10e	2175	Idle
	Priest Valley Pet. Co., Greve	1	22, 20s-12e	2885	Stdg. cem.
Sacramento	Independent Exp. Co., Perry	1	19, 7n-6e	4806	Idle
San Joaquin	Standard Oil Co., Blewett	1	25, 3s-6e	1031	Drilling
San Mateo	Ra-Lite Petroleum, Inc., Bell	5	16, 7s-4w	1200	Idle
Solano	Richfield Oil Corp., Potrero Hills	3	10, 4n-1w	1572	Drilling
Yolo	Standard Oil Co., Tippets	2-1	9, 12n-3w	3040	Testing
Yuba	Wright, L. G., Cox	1	18, 14n-5e	1795	Idle

paring to bring in Toussau No. 2 The hole was carried to 7775 ft. and plugged back to 7305 ft. where a liner was landed and cemented through perforations at 6713 ft. Although some of the zone appears to have changed from sand to siltstone in this well, production should be good enough to call for an offset by Bartholomae Oil Corp. to the south.

Meanwhile, Bartholomae is preparing to deepen its Stern No. 4, an old producer in the 5000 ft. zone and Standard plans to carry down Coyote No. 2-10.

On the north flank of the field, California National Oil Co. is coring at 3250 ft. while in the old central area Graham & Loftus Oil Co. is testing No. 16 after deepening to 3332 ft.

2nd Del Valle Well Seeks Miocene Contact

Lincoln No. 2, second well drilled by R. E. Havenstrite, Operator, in the Del Valle field, is coring at 5760 ft. for the top of the Miocene which was placed at 5750 ft. in the discovery well. From what little information is available to date, No. 2 appears to be slightly lower structurally than No. 1.

To take care of the high gas yield expected in all wells in the discovery area, Del Valle Gasoline Co. is moving the Rancho gasoline plant from the Grapevine field to the Lincoln lease. The Parkhill-Wade company is doing the work on contract.

Although locations have been surveyed and roads graded for several more wells, only one string of tools is now active.

Two Wells Test In Potrero Field

Hoping to add materially to the light oil output of the Potrero field, two companies are testing newly drilled wells. On property of the Hollywood Turf Club, Turf Oil Co. is trying out the Willis zone in No. 2 which is open from 5734 to 5804 ft. while on the Country Club property, Basin Oil Co. is gun-perforating casing set on bottom at 5218 ft.

Virtually rediscovered in 1938 by Basin Oil Co., Potrero has risen from a 1937 daily average of 316 bbls. to 2100 bbls. a day. The 21 wells now producing have a combined potential of 3119 bbls. daily.

Royalty Service Plans 6500 Ft. Signal Hill Well

At the southeast corner of 33rd St. and California, Royalty Service Corp. is planning to drill in the Long Beach field. Intentions at present are to carry the hole to about 6500 ft. where it is believed good production will be found. The location is at the northerly limit of the field where much new drilling will result if the project is a success.

Two wells are being completed in the Orange Ave. section. On the north side of 29th St. between Gundry and Walnut, Taylor & Associates are pumping in a 4725 ft. well on Massey property while at the northeast corner of Willow and Orange, Apex Petroleum Co. is recompleting Morris No. 13-A at 4906 ft. Derrick is up for Morris No. 17.

Union Oil Co.'s deep offset to Dormax has overcome its circulation trouble and is making good time below 8500 ft.

The Texas Co. is drilling its 17th well on the Harlow-Kent lease near 28th St. and Gundry.

Bush Oil Acquires Deep Inglewood Well

R. R. Bush Oil Co. which discovered the Inglewood deep zone in August of this year has taken over the deep Federal Oil Co. well at the north end of the field. As soon as a division of the leases can be completed the Bush interests will sidetrack the fish in the bottom of the 7880 ft. hole and carry on to the 8325 ft. horizon of the discovery well.

Offsetting Bush's first well, Standard Oil Co.'s Los Angeles Investment No.

Season's Greetings

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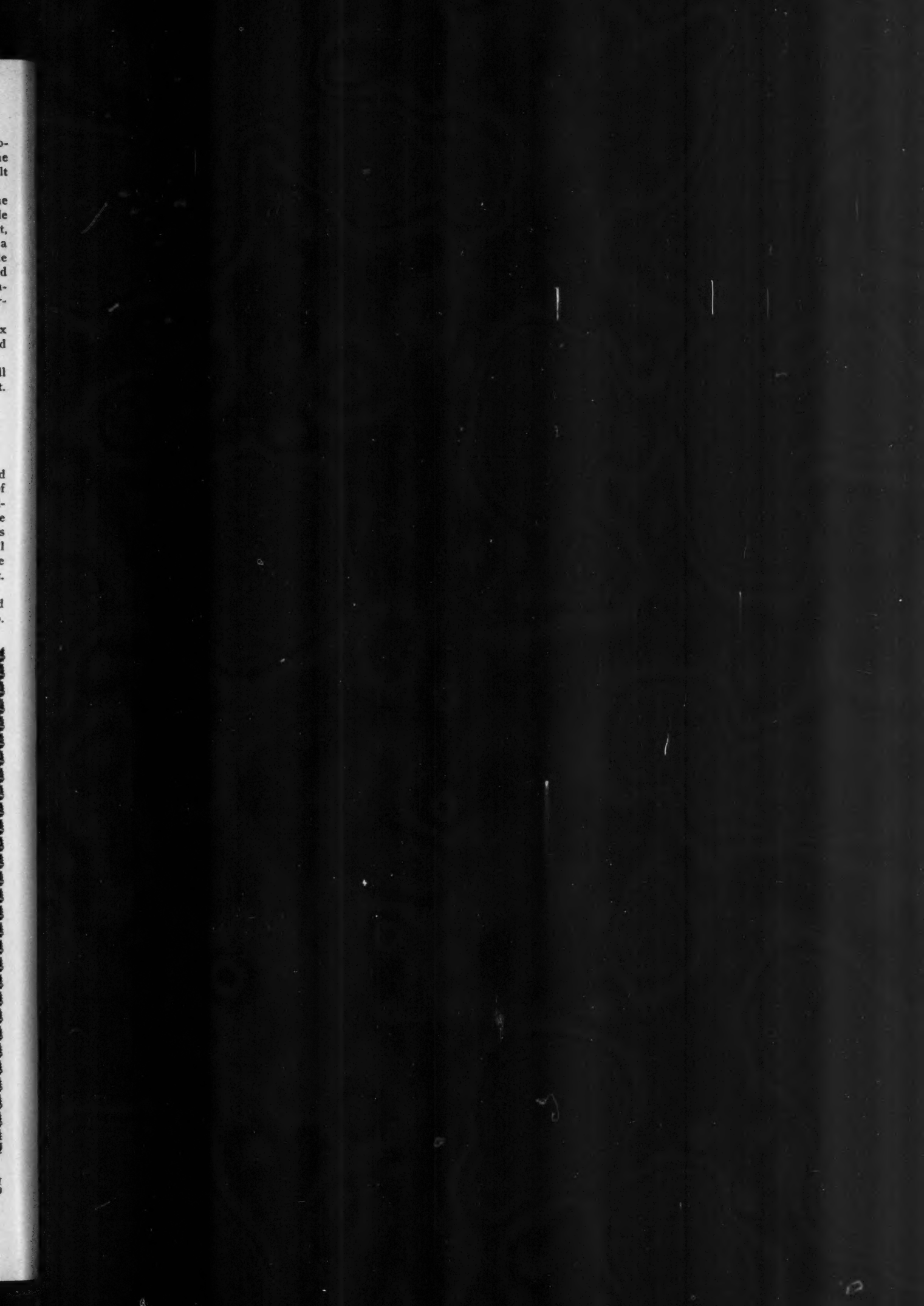

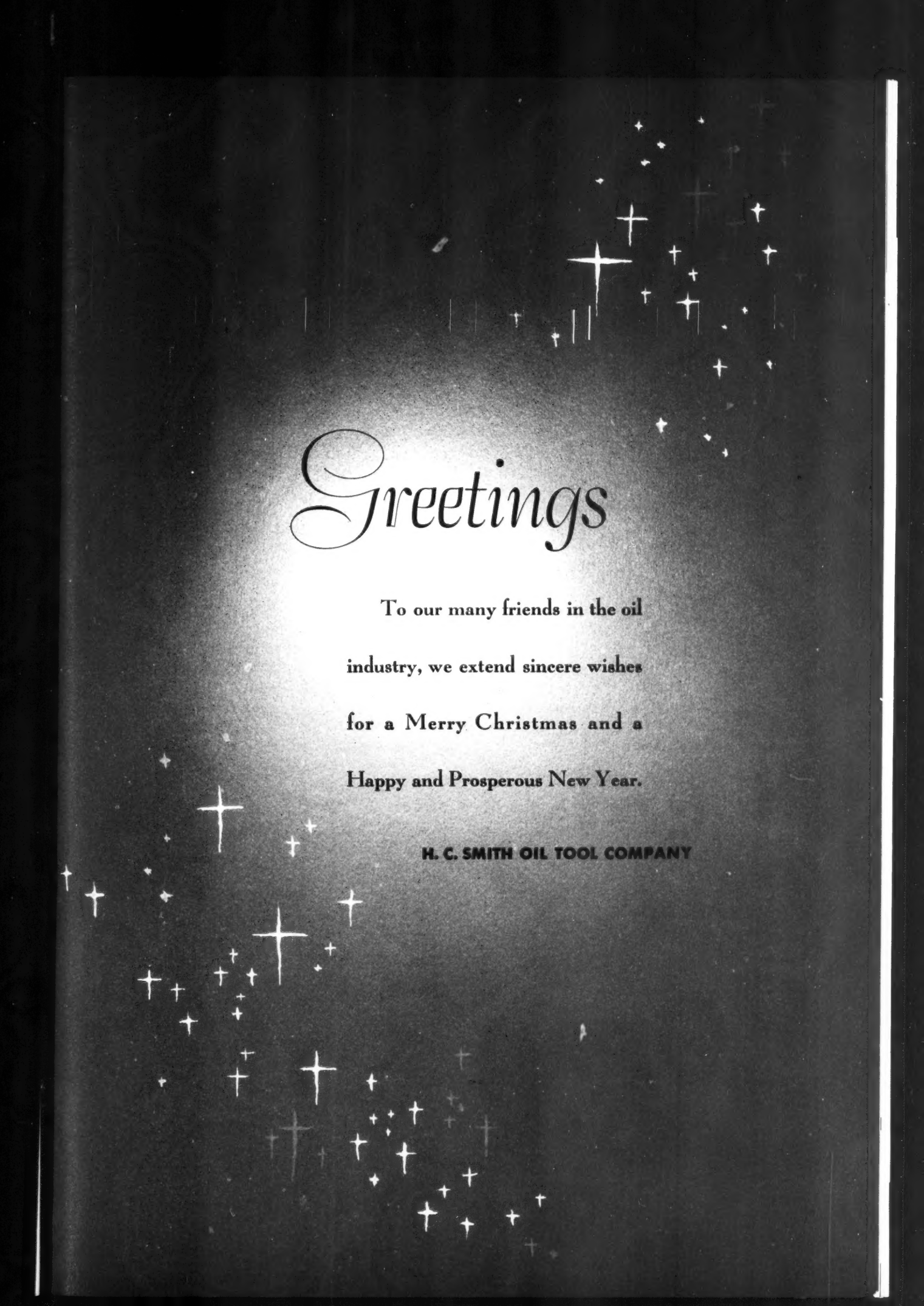
Greetings
To our many friends in the oil industry, we extend sincere wishes for a Merry Christmas and a Happy and Prosperous New Year.
H. C. SMITH OIL TOOL COMPANY

3-1 is below 8500 ft. and showing much oil and gas on the ditch.

First of the new group of wells within the old proved area to go on production is Kettleman & Inglewood Corp.'s Rubel No. 26. With 500 ft. of formation open to bottom at 3855 ft., the first 14 hours' production was 307 bbls. of 29 gravity oil and 14 bbls. of water. Rubel No. 27 is drilling at 1500 ft. Both were contracted to Brown Drilling Co. Standard Oil Co. is preparing to complete L.A.I. No. 1-86 at 3930 ft. after setting 9 in. casing at 3428 ft. and is preparing to spud in No. 1-85.

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Wood-Mellon Well Rigging Up Pump

After swabbing failed to produce a flow or even much fluid, the Wood-Mellon well at Victoria Ave. and Figueroa St. is being rigged to pump in a final effort to develop production. Swabbed nearly dry on several occasions, a little oil entered the hole encouraging the operators to install equipment for a prolonged pumping trial.

Perforations are open from 6830 to 6860 ft. and 6750 to 6800 ft. in what is believed to be the equivalent of the Sixth Callender zone of the Dominguez field.

Valley Petroleum Plans Kreamer Well

Valley Petroleum Co., newly formed by Attorney Fredrick W. Bahls of Los Angeles, is negotiating with the Kreamer interests to drill in the Santa Ana Canyon field. M. H. Soyster is reported to be selecting a location near the Congress well which was drilled about four years ago at the northwest edge of Standard Oil Co.'s Kraemer One lease.

Athens Outpost Cores Zinns Shale

Rankin & Williams' Athens outpost, located on the golf course at the southwest corner of 120th and Main Sts., is drilling below 7050 ft. after reporting the top of the Zinns Shale at approximately 6900 ft. This correlates considerably lower than wells in the old proved area to the south and west.

United Cleaning Out Monterey Park Wildcat

After recovering drill pipe lost while reaming at a shallow depth, United Petroleum Co. is again cleaning out the old Wales Petroleum Co. Haig No. 1 at Monterey Park. The hole which stood idle for three and a half years was in poor condition but is now reopened to within 300 ft. of the old bottom of 3370 ft.

Dominguez Outpost Still Won't Produce

Larronde No. 5, Havenstrite's West Dominguez jinx well, still failed to flow after numerous swabbing tests and was reperforated in the Seventh and Eighth Callender zones in an attempt to get the oil to enter the hole. Bottomed at 7818 ft., the well is low on the structure.

Larronde No. 6 is rigged up waiting for the crew which is now trying to bring in No. 5. No. 6 is equipped with a new big spark plug outfit.

Union Oil Co.'s Dominguez deep test, Callender No. 79, has passed the 11,000 ft. mark and is still making hole. Only company employees know the results of the extensive coring that has been done but close observers state that no formation tests have been run.

Cal-Pico Suspends Durfee Road Project

With formation tests from 6500 ft. and 6000 ft. offering no encouragement, Cal-Pico Oil Co. suspended operations in its Beach No. 1 located on Durfee Road east of Montebello. The hole was carried to 7788 ft. before being plugged for the trials.

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Coastal District

Republic Postpones Gato Operations

Republic Petroleum Co. has postponed drilling Price No. 1 for which derrick was built last month in sec. 16,8-32, on the southwest flank of the Gato Ridge field. It is unofficially reported, however, that operations will be resumed some time after the first of the new year.

In the southerly portion of the field, The Petrol Corp. is deepening its Tognazzini No. 3-15, bottom now being below 3750 ft.

The Texas Co. Plans New Elwood Wildcat

Still believing in the possibilities of the area north and east of the Elwood field, The Texas Co. has location surveyed for Bishop No. A-2 approximately 800 ft. north of No. A-1. The new well will test the Vaqueros formation which was found barren in the first try at a depth of 3300 ft. No. A-1 was abandoned at 4350 ft. in August of this year after drilling 600 ft. into the Sespe.

Transoceanic Active At Santa Barbara Mesa

Resuming activity on Santa Barbara Mesa, Transoceanic Oil Co. drilled M'divani-Lowe No. 6 to 1550 ft. and completed pumping 30 bbls. of 15 gravity clean oil from 32 ft. of Vaqueros sand. Equipment was moved to the Wallace lease where M'divani-Wallace No. 1-A is being drilled near the 1000 ft. level.

Union Continues Santa Maria Work

With two wells drilling, rig up for a third and locations graded for a fourth and a fifth, Union Oil Co. is the only active operator in the entire Santa Maria Valley field. Those wells making hole are LeRoy No. 6 which is below 5000 ft. and Morrison No. 3 which has just spudded in. Locations are being prepared for Moretti No. 3-1 and Fleisher No. 1, the latter a southeast extension project.

Union's last completion was McCoy-Cooney No. 2 in the central area where, with 200 ft. open to bottom at 5440 ft., production was 125 bbls. a day.

Bardsdale Wildcat Tests Sespe Sands

American Seamless Tube Corp. of Los Angeles is making a production test in Basola No. 1 between the Shiells Canyon and Bardsdale fields after plugging the old hole to the shoe of the 7 in. casing at 2815 ft. and redrilling to 2995 ft. The new hole was directed away from a fault which is believed to have cut off all but a few feet of oil sand in the original bore which was bottomed at 3140 ft.

Texas Co. Spuds Oxnard Wildcat

Northeast of the city of Oxnard The Texas Co. spudded in its new wildcat, Montgomery No. 1 which presumably will seek production in the same shoreline as the E. A. Bender project located a mile due west of town. Heavy equipment is being used which is capable of drilling to extreme depths if necessary.

Work has been temporarily suspended on the Bender well at 5007 ft., nearly 2000 ft. short of its intended objective but those interested in the well state that work will be resumed shortly.

Majors Finish Ventura Wells

Recent completions in the Ventura Avenue field have all been made by major companies with the largest credited to Shell Oil Co. whose Edison No. 36 established a potential of 1392 bbls. a day from 9508 ft. The company's Taylor No. 127 flowed 468 bbls. daily on gas lift while Tide Water Associated Oil Co.'s Lloyd No. 115 came in at a 580 bbl. rate.

Plugged back from 10,475 ft., Lloyd Corp.'s No. 5 is reported to be flowing by heads from the interval 8000-8600 ft. Of the drilling wells, British American Oil Producing Co.'s Hartmann No. 11 is the most interesting as it nears its final depth. Located in the north-central section of the field, bottom was last reported at 8620 ft.

South Mt. Work Now Stalemated

Development work at South Mountain now appears stalemated as continued tests of the California Securities Oil Co. well have recovered only water with a small quantity of oil. On the adjoining property, Comstock Petroleum Co. is down approximately 1800 ft. working one tour a day.

Drilling has not been started by South Mountain Oil Co. which holds leases abutting the Wilshire Annex Oil Co. well on the south side of the field.

COASTAL COUNTIES WILDCATS

Area	Well	No.	Section	Depth	Status
Santa Barbara County					
Elwood	Bolsa Chica Oil Co., Permit	191–7	24, 4-29	4313	Idle
	The Texas Co., Bishop	A–2	13, 4-29		Location
Goleta	Coates, Spencer D., Hollister	2–A	3, 4-29	1570	Cleaning out
Summerland	Barnato Corp., The, Hyland	1	16, 4-26	3415	Idle
San Luis Obispo County					
Huasna	Tex Harvey Oil Corp., Gilmore Comm.	1	11, 32-14	4518	Swabbing
Ventura County					
Bardsdale	American Seamless Tube Corp., Basola	1	5, 3-19	3140	Running liner
	Elkins, Reed	1	5, 3-19	902	Idle
	Hopland Oil Co.	1	1, 3-19	250	Stdg. cem.
	Palma Oil Co., Elkins	1	8, 3-19		Grade
	Westoil Corp.	1	6, 3-19	525	Idle
Conejo	Sulphur Springs Oil Co., Janss	1	33, 2-19	4526	Idle
Ojai	Seaport Oil Corp., Arnett	3	15, 4-21	2521	Idle
	Norwood Oil Co., Coronet	2	17, 4-21	3250	Pumping
	Norwood Oil Co., Coronet	3	17, 4-21		Grade
	Per-Col Oil Co., Anlauf	6	21, 4-21	2105	Testing
Oxnard	Bender, E. A., Farrell	1A	5, 1-22	5007	Idle
	The Texas Co., Montgomery	1	13, 2-22	50	Drilling
Piru	Nelson, D. V., P.F.C.—C.H.	1	19, 4-18	400	Drilling
	Oilexco, Inc., Core Hole	2	2, 3-18	570	Testing WSO
	Oilexco, Inc., Stevens	1	34, 4-18	373	Idle
Sespe	Inter Counties Fuel Co.	1A	22, 4-19	420	Drilling
	Riley, Irene Burson	1	18, 4-19	2050	Idle
	Rio Hondo Oil Co., Cosby	1	14, 4-19	1695	Idle
	Signal Petroleum Co.	7	13, 4-19	1688	Drilling
South Mountain	Bolling Oil Co., Schieferle	1	17, 3-29		Cellar
	Calif. Securities Oil Co., Schieferle	1	17, 3-29	4501	Cleaning out
	Comstock Pet. Co.	1	17, 3-29	1800	Drilling
	South Mountain Oil Co.	1	10, 3-20		Location
Sulphur Mt.	Madison Oil Co., Delphy	1	24, 2-22	2501	Stdg. cem.

San Joaquin Valley

Two Drilling For Paloma Extension

Moving a mile southeast of its Paloma field discovery well to the northwest quarter of sec. 12,32-26, Western Gulf Oil Co. is below 9515 ft. in its extension test KCL No. B-12-12. A mile to the west, foundation has been poured for KCL No. A-32-11 as a further trial of the structure as outlined by leases jointly held with The Texas Co.

After finishing two wells in the discovery section 3, Ohio Oil Co. is drilling KCL No. A-9-83-4 near the east line of sec. 4,32-26, in an effort to push production limits westwardly.

Scheduled to begin operations in early January, Barnsdall Oil Co. is grading roads to a point in the southwest quarter of sec. 34,3-26, where a northerly outpost will be drilled on land owned in fee by Houchin Farms, Inc.

With only five wells completed and but two strings working, it appears probable that actual limits of production will not be determined for some time; a contention further strengthened by the popular belief that the field will, when outlined, cover a relatively large area requiring a long drilling program.

Cheney Ranch No. 2 Drills Cretaceous

In the Mendota area of Fresno county, some 20 miles northwest of Coalinga, Jergins Oil Co. and a syndicate of other California operators are drilling a second test of Cheney Ranch holdings.

Located a short distance southeast of Cheney Ranch No. 1, in sec. 29,14-13, well No. 2 was last reported in Cretaceous shale at 6370 ft. after finding the section at approximately 6180 ft., some 72 ft. lower than the equivalent point in the original hole.

The first well found sands of low porosity and permeability and the second was started in hopes of finding better reservoir conditions in the same horizons. Tests of the 7000 ft. level in the 9345 ft. original hole showed a low volume of gas under high pressure.

Continental Plans New Shafter Well

Still prospecting along an imaginary line drawn through the Wasco and Rio Bravo oil fields, Continental Oil Co. is preparing to drill another of the 13,000 ft. holes common to the area. Located in the northeast quarter of sec. 35,27-24, the current try, KCL No. C-2, is but two miles northwest of a 13,028 ft. well drilled by the company earlier in the year. The last well, Community No. 1, was drilled in the northeast corner of sec. 12,28-24 and recovered only salt water from Vedder sands tested at bottom.

Less than a mile northwest of the proposed test, Continental, aided by other companies, drilled No. C-1 to an equally unfruitful 13,064 ft. during 1938. An equal distance southeast of the new activity, Union Oil Co. drilled Kernco No. 1-36 to Vedder sands at 12,985 ft. early in 1939. A slight amount of high gravity oil was recovered from this well.

The aforementioned imaginary line, if drawn straight through the axis of each field, would pass through each of the mentioned tries indicating a hope that a structure will be found at some point between the fields.

Standard Rigging Elk Hills Deep Try

Rigging up is nearly complete on Standard Oil Co.'s projected basement try in sec. 31,30-24 of the Elk Hills field. Known as well No. 42-31S, the test is expected to drill as deep as possible in an effort to clarify once and for all the geologic picture in this area.

The ability to accomplish this feat will be demonstrated by the finest super drawworks and engines that money can buy. The company admits no intention to attempt any record breaking performances but the fact that 16,000 ft. of new drill pipe has been assigned to the well indicates that the world's depth record may be exceeded in this test.

Nine miles southeast of this deep try, Honolulu Oil Corp.'s No. 25-P, basement try in the Buena Vista Hills field is reported at 11,114 ft. with no showings of importance yet logged. Like Standard, Honolulu also has denied any attempt to startle the drilling world but rather is concerned with gaining full knowledge of formation underlying the old shallow producing areas. Electric power is used in this project.

Kern Line Test Waits For Casing

Kern Line Oil Co.'s 8320 ft. wildcat near the center of sec. 19,11-19 is circulating and waiting for casing to properly test showings recorded on the electric log. While core recovery was so poor as to be almost non-existant in this well, the recorded picture, according to the operators, is held justification for casing the hole.

Located on the Grapevine plains at the south edge of the San Joaquin Valley, the well is near subdivided sections

SAN JOAQUIN VALLEY WILDCATS

Area	Well	No.	Section	Depth	Status
	Fresno County				
Coalinga	Lewis, C. H.	1	18, 21-15	2298	Idle
	Tide Water Assoc. Oil Co., Guardian	23	2, 20-15	3731	Testing
Gatos Creek	Gatos Creek Oil Co.	1	19, 19-13	725	Drilling
Mendota	Jergins Oil Co., Cheney Ranch	1	29, 14-13	9345	Idle
		2	29, 14-13	6220	Drilling
	Kern County				
Belridge—South	DeLanty & Sutton, Trustees	1	28, 28-22	3020	Idle
	Santa Mora Oil Co.	1	10, 28-20	590	Idle
Buttonwillow	The Texas Co., S. P.	47-15	15, 29-24		Grade
Devils Den	Herzog, R. D., Marine	28	26, 25-18	150	Drilling
Edison	Goodrum & Vincent, Inc., S. P.	7	31, 29-30	460	Idle
Grapevine	Kern Line Oil Co.	1	19, 11-19	8320	Circulating
	Richfield Oil Corp., Tejon Ranch	1	2, 10-19	9134	Drilling
Lost Hills	Argo Pet. Corp., Farnsworth	1-A	11, 26-20	1332	Idle
	Randan Pet. Corp., Theta	1	3, 26-20	1625	Rigging up
	The Texas Co., Theta	2-28	2, 26-20	1301	Completing
McKittrick	Smith, Ebert E., Smithhart	1	34, 30-22	2100	Drilling
Richgrove	Borget, A. J., Kendall	1	16, 25-27	40	Idle
Round Mountain	Spartan Drlg. Co., Hiatt	1	32, 28-29	2085	Idle
Shafter	Continental Oil Co., KCL	C-2	35, 27-24		Setting boilers
Strand	Tide Water Assoc. Oil Co., KCL	56-8	8, 30-26		Location
Union Avenue	Hancock Oil Co., Roberts	1	6, 30-28	4453	Drilling
Wheeler Ridge	Richfield Oil Corp.	KCL 2	28, 11-20	10934	Tested wet.
	Kings County				
Pyramid Hills	Pyramid Prod. Co., Spreckles	2	16, 24-18		Rig
	Tide Water Assoc. Oil Co., West Slope	31	20, 24-18	1970	Abandoned
Reef Ridge	Blair Oil Co., Blair	1	24, 23-16	72	Drilling

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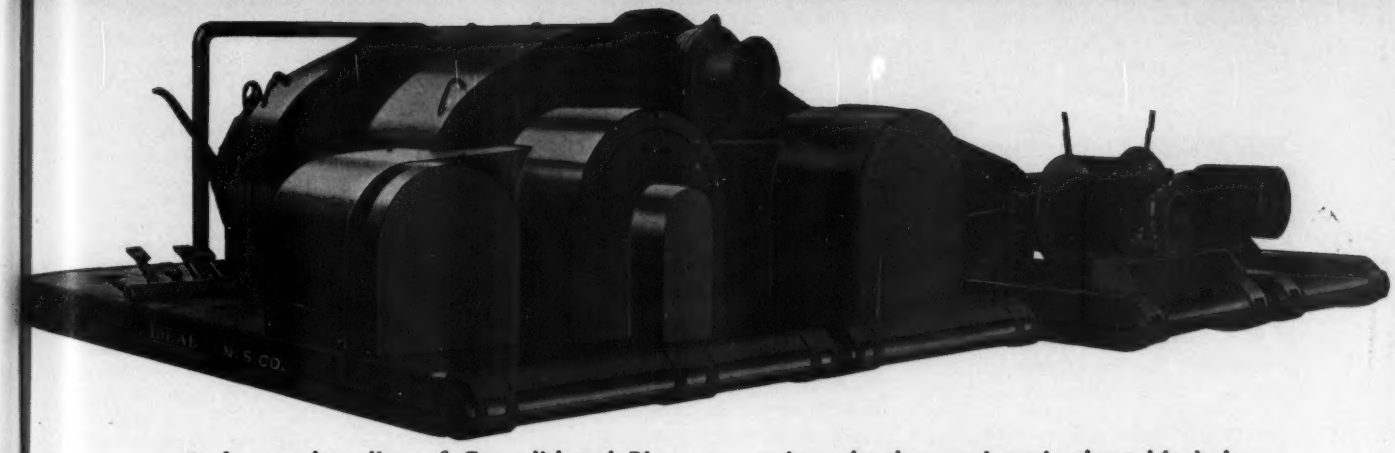
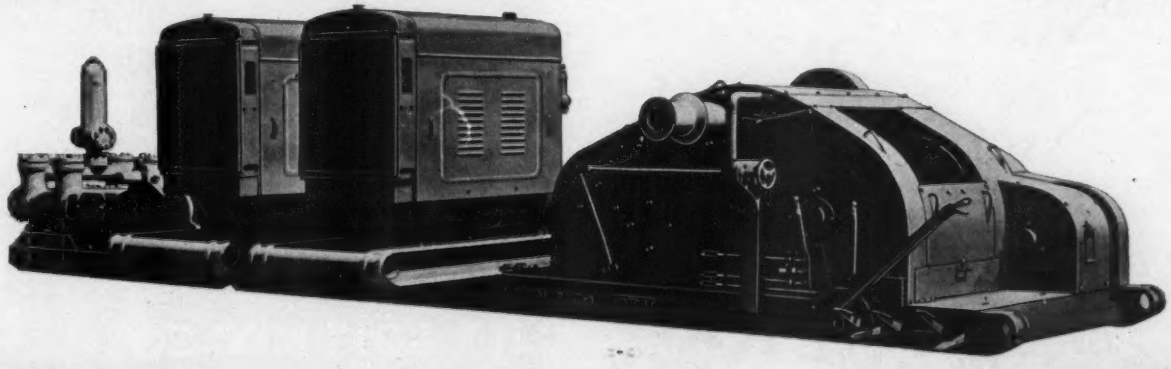


● A complete line of Consolidated Rigs—representing years of research and practical field development—is now offered by The National Supply Company for drilling to various depths as given in the table below. Driven by Internal Combustion Engines, these rigs feature easy portability and smooth operation.

Descriptive literature will be mailed upon request.

	Drilling Depth Using 4½" Drill Pipe	Nominal Power Rating	Number of Hoisting Speeds	Number of Rotary Speeds	Drum Size, Diameter and Length
Type 40	4,000'	150 H. P.	4	4	16" x 44"
Type 50	5,000'	350 H. P.	6	3	16" x 34"
Type 75	7,500'	500 H. P.	6	3	23½" x 35"
Type 100	10,000'	650 H. P.	6	3	26" x 46"
Type 125	12,500'	950 H. P.	6	6	28" x 42"



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under lease to many operators, a condition which would excite a minor drilling boom in the event of a strike.

Southeast of this test, Richfield Oil Corp.'s Tejon Ranch No. 1 in sec. 2,10-19 is drilling below 9150 ft. That this well may prove to be a deep try on the Valley floor is a suspicion unconfirmed by company officials, but strengthened by the fact that the mechanical rig in use, once having drilled to below 11,000 ft., has been rebuilt and repowered with more and faster engines.

Pac. West'n Quits On Wasco Outpost

Attempts to extend Wasco field limits a quarter of a mile to the west failed when Pacific Western Oil Co. abandoned Meyer No. 1 after twice drilling into the A-2 sand and recovering only salt water with a trace of oil and gas.

Located a thousand feet east of the west quarter corner of sec. 7,27-24 and a quarter of a mile west of Geo. F. Getty's Janssen No. 1, the well botomed in A-2 sand at 13,150 ft. on the original drilling. Tests here yielded a wet flow and the hole was plugged and retested each time recovering salt water. Plugged and redrilled from 10,960 ft. and bottomed in a directional hole at 13,145 ft., only 7 ft. below the top of the normally productive A-2 sand, tests again produced a salt water flow and the well was abandoned.

Only some 55 ft. lower than the adjacent production, Meyer No. 1 was too low to achieve production from the very thin, high pressure sands from which Wasco wells flow.

Drilling in the center of the yet small field, Standard Oil Co.'s Mushrush No. 6 is drilling in shale at 10,525 ft.

Central Valley Generally Active

Central San Joaquin Valley fields are maintaining a steady development rate which, in due course and with respect for conservation measures, will soon mark out the limits of present zones.

Coles Levee, between Taft and Bakersfield, is represented by 16 strings, the scope of which covers all portions of the field. Depths here average 9600 ft. with sands varying from black oil sand in the easterly section to gas cap, high pressure sands at the westerly flank.

The Rio Bravo-Greeley area is enjoying 13 string activity with substantial flows regularly made from approximately 11,500 ft.

Ten Section, wholly controlled by Shell Oil Co., is being "worked-up" by four strings under slim-hole drilling practice. Latest to finish was KCL No. A-85-30 which flowed 2116 bbls. of 35 gravity oil on open flow. Gas was measured at 3,613,000 cu. ft. from this hole with plugged bottom at 8195 ft.

West Edge Well Hits Gatchell Sand

More closely pegging the westerly pinch-out of the Gatchell sand in the Coalinga Northeast field, Pure Oil Co. found 21 ft. of permeable zone in Schwinn Estate No. 2 which is located in the southeast quarter of the northwest quarter sec. 30,19-16. Directed to the east from its surface site, the well found the green sand marker at 7741 ft. and entered the productive sand at 8251 ft. Basal siltstone was topped at 8272 ft. Casing has been cemented and the well is being readied for completion.

Bandidi Petroleum Co. mechanically completed its No. 61 in sec. 30 with 30 ft. open to botom at 8225 ft. but the flow test was delayed because of lack of pipeline facilities. In the same section, Wilshire Annex Oil Co. is drilling No. 53 at 7800 ft. while Pacific Western Oil Corp. & Geo. F. Getty, Inc., have East Coalinga Comm. No. 2 below 7000 ft. and Goodell No. 1 near the 6200 ft. level in a directional redrill job.

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37 in sec. 17,19-16, which was carried to 9511 ft. as a deep test, is now attempting to complete in the Gatchell sand at 8223 ft. Approximately 800 ft. of sand was found in this well, an easterly outpost, but only a few feet at the top contained oil.

Coalinga Nose Work Enters Final Phase

With 95 wells completed with a combined potential of 472,300 bbls. a day, development work in the Coalinga Nose area is entering its final phase. Commercially productive limits of the Gatchell sand at present are reasonably well defined by outlying wells in the extreme southeast section where Standard Oil Co. and Robert S. Lytle, Operator still have several strings of tools running. It is estimated that 20 to 30 proved locations remain to be drilled which, at the present rate, will require about eight months.

The twin pool to the north, discovered in the spring of 1939 a year after the Nose, is considered 75% drilled up with 46 wells on production. Potential of the Northeast field is 145,375 bbls. a day.

T.W.A. To Drill Strand Outpost

Tide Water Associated Oil Co. has located KCL No. 56-8 near the center of sec. 8,30-26 to try for an extension of the Strand pool sands a mile due east of present production from the Stevens zone.

Within the field Tide Water's search for Vedder zone production believed to underlie the present producing zone progresses with KCL No. E-25-7 reported in shale at 10,792 ft.

Hancock Cores Chanac Shows

Approximately 45 ft. of poor Chanac oil sands were cored in streaks from the interval 4085 ft. to 4275 ft. in Hancock Oil Co.'s Roberts No. 1 at the Bakersfield outskirts. Located on the Union Ave. plunge property in sec. 6,30-28, the well was last reported in gray sand at 4445 ft.

These showings are held to correspond to the meager sands which Richfield Oil Corp. tested in its 10,427 ft. hole on sec. 6 in 1938. The Richfield well bottomed in lower Miocene and is said to have found the Vedder section to be all shale. Sole petroleum returns in the well were traces of oil on formation tests in the Santa Margarita from 5179 to 5221 ft.

Texas Co. Grades Valley Drill Site

Another of the anticipated many deep Valley wildcats is starting in the Buttonwillow area where The Texas Co. is grading for S.P. No. 47-15 on sec. 15, 29-24. This location is between two previous deep tests, each of which found sand bodies which were too impermeable to produce. It is held probable that if similar sands can be found in less tightly packed formation, commercial production may be effected.

Oil Failure May Be Gasser

Drilled to an oil-less 11,728 ft. in the center of sec. 22,24-23 in the Trico gas field, Tide Water Associated Oil Co.'s Daniel No. 35-22 has been plugged for tests of the normal gas producing Mya horizons near 2500 ft.

Since Tide Water controls only oil rights to the lease, Trico Oil & Gas Co., discoverer of the field, is carrying on the work. A quarter of a mile northwest of the deep hole, Trico recently finished Fee No. 1 flowing 35,000,000 cu. ft. of gas from 2502 ft.

Clear View Spuds Five Points Well

First new well for the Huntington Beach Five Points area in several months was that spudded last week by Clear View Oil Co., the second on the Williams lease. Present depth is approximately 4000 ft.

In the Old Field, Harold C. Morton finished his Well No. 1 with 100 ft. open to bottom at 4610 ft. No estimate of production was available at press time.

Operating two strings of tools continuously on its Bolsa lease, Signal Oil & Gas Co. is finishing wells in the Ashton zones with clock-like regularity. Yields are from 100 bbls. a day up.

On the Ocean Front, Southwest Exploration Co. is drilling State No. 34 while The Termo Co. is nearing completion in its Fee No. 6.

Wheeler Ridge Try Flows Salt Water

A formation test of Eocene sands from 10,862 to 10,934 ft. yielded a 300 bbls. daily flow of salt water cutting 1.0% oil in Richfield Oil Corp.'s second deep Wheeler Ridge well, Wheeler Ridge-KCL No. 2.

Located near the south quarter corner of sec. 2-11-20, a little less than a half mile south of the original deep test, the well is reported to be maintaining the same flow of water as a daily average. The slight trace of oil is said to be 38 gravity and only a slight blow of gas is present.

Well No. 1 found identical results in an exhaustive series of tests up-hole from bottom at 11,168 ft. While the original well never attained oil production in the deep horizons, it did make a considerable quantity of 38 gravity oil from middle Vaqueros sands before water broke in necessitating a deepening operation.

Walter W. Brown Appointed Smith Meter Co. Vice President

Walter W. Brown, who, for the past 14 years, has been connected with the Ralph M. Brodie Co. of Oakland, California, has been appointed to the vice-presidency of the Smith Meter Co. at Los Angeles.

"Mr. Brown's appointment to this post," said H. F. Detrick, president of the Smith Meter Co., "comes as a result of his years of experience in the marketing and distributing branches of the petroleum industry. For many years, Mr. Brown has specialized in the development and use of meters for measuring petroleum products at both wholesale and retail points of sale."

The company recently announced a new line of meters which incorporate many improvements developed in their laboratories through close contact with field conditions. All Smith Meters are of the rotary type and have established a reputation for extreme accuracy and measuring speed. The new line includes three sizes in truck meters, five models of line meters from 0 to 650 gallons per minute, and five high-pressure meters capable of handling up to 650 gallons per minute and operating under pressures up to 1000 pounds.

Link-Belt "Friction Fighter" Bearing Book Now Ready

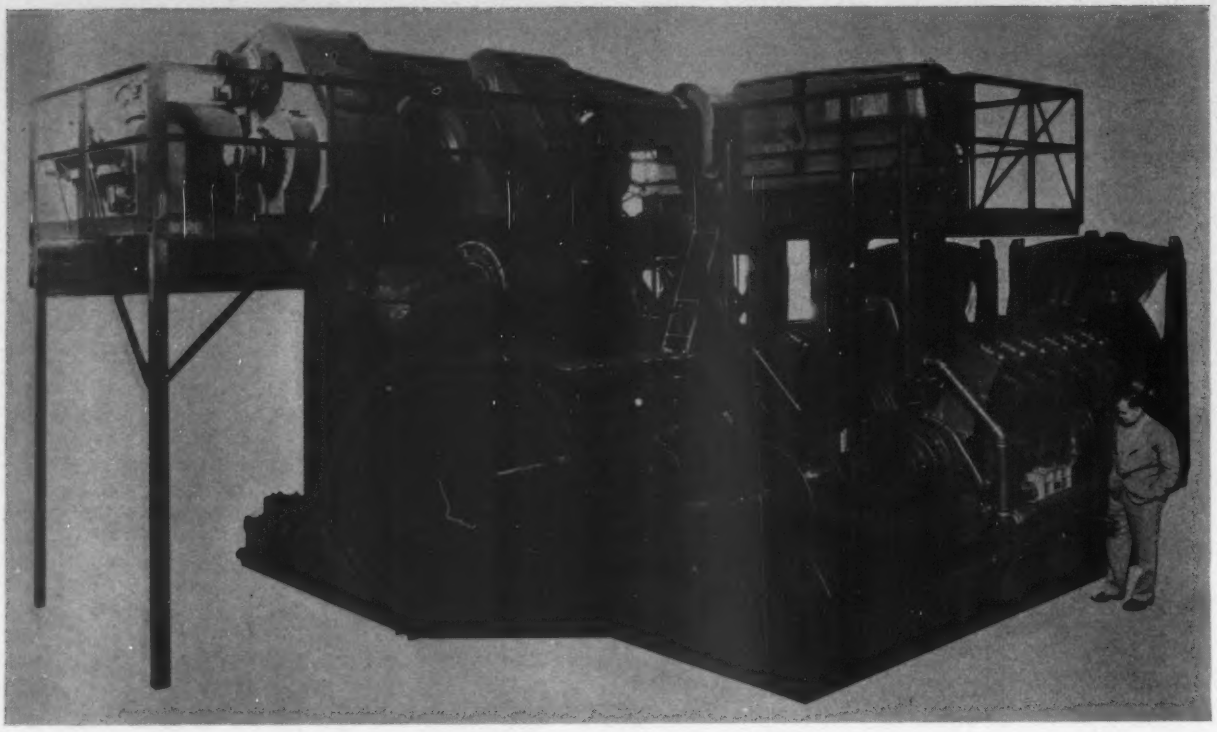
Apropos of the recent announcement that Link-Belt Co., Indianapolis, had renamed its line of anti-friction roller and ball bearings in all the various styles of housings, they have now completed a new 88-page data book No. 1775 for the aid of all who have occasion to use, recommend and buy bearings and other power transmission equipment. Unmounted bearing units also are covered.

Pages 1 to 10 show why they have seen fit to discard the conventional negative "anti-friction bearings," and instead, call them by the more positive term—"Friction Fighter Bearings." As these bearings, with their free-turning rollers, really do fight friction, it seemed but logical to so designate them.

Complete tables of sizes, dimensions, weights and list prices are given. Then there are tables of load ratings and minimum life expectancies. A number of pages are devoted to the selection of the proper unit for each class of service. Much engineering information is given.

This new Link-Belt "Friction Fighter" Bearing catalog No. 1775 will be sent free upon request addressed to the company on business letterhead.

Emsco Spark Plug Rig Drills 12,000 ft. Easily



A foreign operator required a drilling plant for consistent drilling to 12,000 feet using the most modern and the most dependable equipment available. To accomplish this depth it was considered that 800 horsepower should be available to the drawworks at all times. The prime movers selected were two VL-12 Cummins full diesel engines, test rated at 425 horsepower each at 800 r.p.m. These engines are twelve cylinder, 7-inch bore and 10-inch stroke, equipped with Twin Disc, type ES 2-clutches connected to the transmission by Fast flexible couplings.

An Emsco type KM-1 transmission was used for compounding the engines. This transmission is a box structure made of ½-inch plate reinforced to 1½ inches at the bearings. Self-aligning SKF bearings are used. They are flood lubricated from the pressure lubricating system within the transmission case. Two oil pumps, one driven from each shaft supply this pressure lubrication. The compounding chain is quad 1½-inch pitch extra heavy, traveling at 2696 feet per minute. Although the original design does not call for a pump drive to be taken from the transmission case, facilities are available for either flood lubricated chain drive from the interior of the case or for a friction clutch equipped v-belt drive from the shaft extension of No. 2 engine. The shaft extension of No. 1 engine drives a 4-inch x 6-inch wash down and general utility pump. From this shaft extension is also a 4-strand chain drive to the Emsco type JA reverse and friction clutch.

The JA reverse and friction clutch employs a twin disc 36-inch diameter clutch rated at 800 h.p. turning at 372 r.p.m. The clutch has a safety factor of approximately 2.5 to 1. The reverse gear is planetary type fully equipped with roller and ball bearings. The shaft has a maximum diameter of 8¼ inches and bearing centers are only 73¼ inches. The whole representing a very rugged and substantial unit. This type of reverse clutch allows for instantaneous reverse operated in the same manner as a steam control with controls at the driller's position. A positive neutral is accomplished by the use of a neutral brake which stops the reverse clutch at the neutral point. Emsco reverse clutches although eminently successful when manually operated with a transmittal as high as 1200 horsepower have also been available with air actuated controls. At the present time a hydraulic booster is considered the simplest and most practical method of shifting. The hydraulic booster consists of a large capacity oil pump and piston mounted together with the oil tank entirely upon the reverse gear frame. The oil pump is driven from the reverse gear shaft and functions at all times when this shaft is rotating regardless of the speed of the shaft. Should the oil pump fail in its operation, there is no change in the control necessary to switch over the manual operation except that instead of using 3 or 4 pounds pressure on the drawworks control, about 25 pounds is required. The movement of the control handle at the drawworks is approximately 15 inches from full forward to full reverse.

The drive from the reverse clutch to the drawworks is equipped with double 3⅛-inch pitch 230,000 lbs. capacity chains running in oil bath.

The drawworks is a new model Emsco type EC-54-8 having 8 speeds available for hoisting and two speeds to the rotary table. This drawworks has a chrome nickle alloy drumshaft of 9⅞-inch diameter at the low speed sprocket and 8½-inch diameter line and jackshaft. These shafts are equipped with large diameter roller bearings all of which are interchangeable. The bearing centers are 107¼ inches. The chains throughout, except on the rotary drive, are double 3⅛-inch pitch of Emsco manufacture. The drum has a spooling space of 33½ inches long with a diameter of 30⅝ inches. The posts are of welded fabriform construction with the chain guard section built integral.

The alemite fittings are centrally located for safety and ease of access. An oil pump of large capacity circulates oil throughout the entire drawworks. A compact panel contains an oil filter

which is mechanically dumped and does not require dismantling or the removal of cartridges. The water circulating system within the brake rims is Emsco's own feature which treats each brake rim as a separate system and prevents a shut-down of the drawworks should trouble develop with one of the stuffing boxes.

The drawworks brakes are of the multiple leverage type with a ratio of 58 to 1. The brake rims are 54 inches in diameter with a 9½ inch wide face. They are press forgings and bolted in double shear. A single 42-inch cradle mounted hydromatic brake is used which is connected to the drawworks by an Emsco flexible type cutout coupling. The water circulation course is so arranged that injection to the rim may be accomplished independently from the hydromatic brake to avoid any possibility of tube crystallization or movement in the stuffing box should any mis-alignment occur between the brake and drumshaft.

The throttle control is built into the drawworks and contains two shafts one for the reverse and one for the throttle tied together with a sprocket and chain arrangement which is alemite lubricated.

Although this drawworks was not originally built for the mounting of a sand reel, arrangements have been made by the addition of heavy beams so that a sand reel may be mounted above the drawworks and driven from the jackshaft. The sand reel is equipped with a cone friction clutch and is operated from the driller's position both as to the clutching-in of the jackshaft sprocket and the friction clutch and brake which are operated from one lever. The drive to the sand reel is flood lubricated. The customer required an O.C.S. hydraulic drilling unit to be mounted on the machine. This was accomplished by the addition of a steel structure which allows for its mounting over the tops of the engines.

The rotary drive is from the drawworks and is completely flood lubricated employing the patented Emsco telescopic adjustable flood lubricated guard idea. The entire plant, as far as the actual operating is concerned, is completely flood lubricated from the rotary table back to and including the transmission.

The entire machine including the substructure and all parts pertaining to the unit are so constructed that it may be erected in the field with a minimum of confusion. It is anticipated that after the first rigging up of this job, subsequent assembling, depending, of course, upon transportation and rig building facilities can be accomplished in the matter of 48 hours. From experience, it is known that the same type of machine in the United States can be moved from one location to another in 32 hours.

The engine and reverse clutch parcel occupy a ground dimension of 16 ft. 8 in. by 15 ft. 10 in. which, considering the size of the engine, is extremely compact. If it were not desired to allow for the driving of the pump from the transmission case, another foot can be taken off of the transmission case making a total ground area for the elements in question of 15 ft. 8 in. by 15 ft. 10 in.

An interesting feature of this rig is the customer's requirement of having wide transportation skids for the engines, reverse clutch and transmission to enable them to more easily handle the weights involved. These transportation skids have proven to be of inestimable value in the shipping of the machine to foreign ports where lifts and skidding are a problem.

It will be noted that on this unit there are only three friction clutches including the master friction clutch, located in the reverse gear, not considering the 4 in. by 6 in. washdown pump drive. The rest of the clutches, including those in the transmission are of the multiple jaw type.

All in all the rig under discussion is so built that there will be very few spare parts required for a good many years of constant hard operation in an area remote from supply store service. It is also of such a character that it will not be necessary to have a specialist on the job as it can be handled by the drillers except in the matter of the engines which probably should require an expert mechanic.

This is the largest machine that Emsco has built from the standpoint of the requirement of a full 800 horsepower for driving the drawworks only. The largest machine which Emsco has built to date is the three Le Roi 350 horsepower gas engine plant now in operation in California. The total horsepower available on this rig is 1050.

Bucyrus-Erie Co. Appoints Texas Panhandle Distributor

Bucyrus-Erie Co., world's largest manufacturers of cable tool drilling rigs, announces the appointment of Murray Tool & Supply Co. of Texas as their distributor of oil well drills for the Panhandle territory.

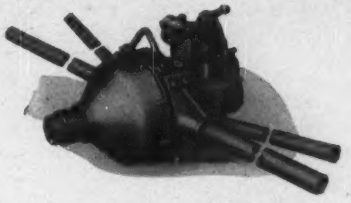
E. C. Sidwell, head of the company, has been an oil well driller for some years and has, therefore, ample background to understand the many problems confronting oil field operators in their work today.

According to L. B. Birckhead, drill sales manager of the Bucyrus-Erie Co. at South Milwaukee, Wisconsin, the firm is located at Pampa, Texas, and is under the supervision of R. C. Riggs, lately appointed Southwestern Representative.

Ingersoll-Rand Co. Flue Rolling Machines

Ingersoll-Rand Co. has introduced two new flue rolling machines, sizes 55-Q and 55-R. Both machines are powered by a "Multi-Vane" type air motor.

The machines are reported to be extremely powerful having been built espe-



Sizes 55Q and 55R Reversible "Multi-Vane" Flue Rolling Machines.

cially for rolling extra large tubes as used in oil refinery stills; tapping for, running in or removing large pipe plugs; tapping flue sheets in large boilers; heavy reaming such as propeller shaft coupling, and for practically any extra heavy work of similar nature.

The manufacturer states that the working speeds of these machines are very low with correspondingly high torque. The size 55-Q has an average working speed of 32 r.p.m. The size 55-R has an average working speed of 20 r.p.m. and approximately 50% greater torque than the 55-Q.

For further details address all communications to Ingersoll-Rand, 11 Broadway, New York, N. Y.

Clearance Chart for Protectors Now Available

The most complete clearance chart ever developed to show the area between rubber protectors and casing in relation to the internal area of tool joints, has been developed by Patterson-Ballagh Corp. All types and sizes of drill pipe are charted, as are all sizes of protectors, giving the O.D. of the protector on pipe, the exact clearance between protector and casing, and other data desired by the drilling engineer. Several thousand calculations were necessary in its development. The chart has been reproduced in convenient bulletin form and a copy may be obtained by writing to Patterson-Ballagh Corp., 1900 East 65th St., Los Angeles, Calif.

Conoco Recompletes San Miguelito Well

With a yield of 525 bbls. in 21 hours, Continental Oil Co. recently recompleted Grubb No. 4, one of the early wells in the San Miguelito field. The old 6940 ft. hole was plugged to 6825 ft. and redrilled to 7315 ft. where a new liner was landed. The oil is clean and tests 30 gravity.

Crew on record speed well, left to right: J. W. Dow, pipe rider; A. T. Green, driller; E. N. Mitchell, tool pusher; G. V. Staats, lead tongs; C. O. Penny, cathead, and "Mac" McCombs, derrick.

World Record Claimed For Harbor Completion

What is believed to be a world record for drilling and completion at 2713 ft. was achieved by the Kern Drilling Co. on Harbor No. 2 for the Sound Petroleum Corp. on Dec. 11.

Certainly a world's record can be claimed for the eight hour tour of 4 p.m. Dec. 9 to midnight when a total of 1595 ft. was completed. Actual drilling was begun at 105 ft. and at the end of eight hours a depth of 1700 ft. was reached. This figures a drilling speed of 199.3 ft. per hour.

A Wilson Power Driven Titan Rig was used to set the record and according to H. & B. Sales Co. of Long Beach, the distributors, it was three years old and had seen service on many drilling jobs.

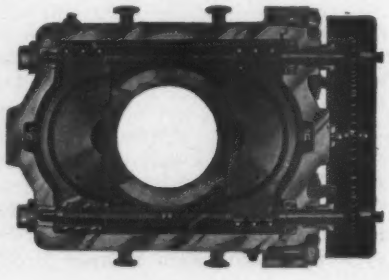
A total of twenty-five hours elapsed from spud-in until drilling was completed. An electric log, well survey, mud conditioning and casing run took but 14 hours.

The entire job from spud until casing landed consumed but 40 hours when the hole was bottomed at 2713 ft. This is the seventh record set by Wilson Rigs, according to H. & B. Sales Co.

New Cellar Control Gates Stronger and More Compact

Simplicity, greater strength, new sealing efficiency and heavier ram construction are features of the Type 38 Cellar Control Gate now being furnished by Shaffer Tool Works, Brea, California for control of drilling wells. The gate is provided with Type 50 Self Centering Rams for closing around pipe or with Type 40 Rams for complete shut-off. These new gates retain all the salient features of previous designs of Shaffer Cellar Control Gates and meet the requirements of latest drilling practice.

The Type 40 Self Centering Rams center small size drill pipe effectively in the bore of the gate. These improved rams



are made with protruding angular guides alternately top and bottom and as the rams move toward their closed position these angular guides engage the drill pipe and move it into central position in the ram. The guides telescope into the opposite ram block which permits the abutting faces to seal perfectly. Ram rubbers may be either rubber or Neoprene.

With these new gates the seal can be effected against both the top and bottom inside faces of the gate body or can be furnished with the seal against the top inside face only and the bottom inside face provided with channels for sand drainage.

As the rams are moved to the closed position the abutting rubber faces of the ram blocks is stopped. The ram block holders continue their movement and the circular band of rubber around the ram blocks is compressed by the inward movement of the ram block holders and thus extrudes this band of rubber against the upper and lower inside faces of the gate body as well as forming a perfect seal around the pipe.

You are reading the Pacific Coast oil men's home paper.

Oil Field Service Has Many Angles

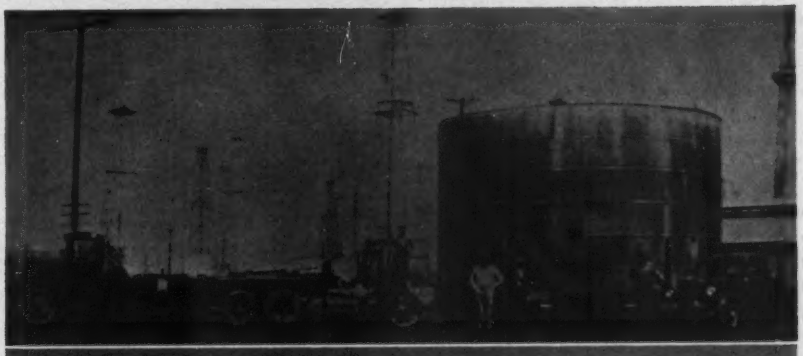
Someone has asked the question—"Of what benefit to the oil industry is the oil field servicing company?" Here for your perusal is the view given by a pioneer servicing company, the Owl Truck and Materials Co., of Compton.

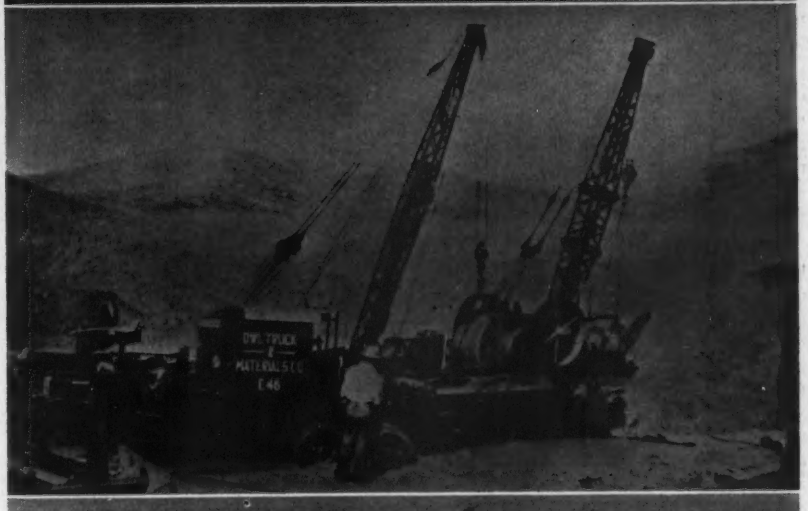
Number one problem to any producer or refiner in starting a new venture is that of transportation. Casing, drill pipe, derricks, boilers and oil well machinery must be dismantled or transported from supply houses or docks to the job location. For this purpose, the servicing company maintains a fleet of

heavy duty winch trucks and trailers and semi-trailers ready on a twenty-four hour basis, all designed to carry legal capacity loads.

All operations are carried out under I.C.C. and C.R.C. authorities, under whose regulations only safe drivers and equipment may be used and in addition, and "very important to the producer or refiner," proper limits of protective insurance are carried, not only to protect the service company but the customer and the cargo are automatically insured against all common hazards.

Certain types of special equipment to be transported to job-site run from thirty to sixty tons in weight and they are sometimes over-height and over-width. Under these conditions, special low-bed trailers are used. Special permits for overload must be secured from local authorities. In order to secure these special permits, bonds are on continual deposit with the state and local govern-





ments to guarantee repairs to roadways and bridges should damage of any kind occur.

Another part of the service company is the derrick division, which maintains special trucks equipped with hoists for erecting or dismantling any design or make of derrick regardless of size, height or weight. An oil field engineering staff is part of this division, whose job it is to design and supervise the erection, skidding and repairing of derricks. Excavating for and placing concrete foundations, platforms, etc. is part of this division's work.

Still another staff of engineers operate the excavating and road-building division, who, with crawler cranes, truck cranes, bull dozers and road maintenance are prepared to lay out the well site, build roads leading to the site, dig sumps, build pipe lines, drive piling, etc. Not everyone understands the large amount of special heavy equipment and technical staff necessary to operate a modern oilfield servicing company but, through the operation of the chief dispatcher, the spark plug of any service organization, various kinds of equipment are dispatched almost overnight to many parts of the state.

One of these oil field servicing companies, in addition to oil field service, operates its own rock and sand producing plants at Monrovia and a decomposed granite plant at Montebello, thereby furnishing its own rock aggregate plus construction and oil well cement, which is warehoused at practically all plants.

In closing it is well to remember that the financially sound and properly equipped service company furnishes its various services at the same rates as any one may, inasmuch as all transportation rates are governed by I. C. C. and C. R. C. regulations. And finally, the service company is one of the oil and gas trades best customers. Thousands of gallons of gasoline and oil are consumed every month by them, thereby putting a good portion of money earned right back into the treasury of the oil companies to whom they furnish oil field service.

Boiler Feedwater Heater Utilizes Exhaust Steam

A new boiler feedwater heater which harnesses wasted exhaust steam to preheat boiler feedwater, cuts up to 1/6 off boiler fuel costs and lowers boiler maintenance costs at oil field boiler plants, is announced by Natural Gas Equipment Inc., Los Angeles. The new device is known as the N.G.E. Industrial Feedwater Heater.

The heater consists essentially of a steel tube 14 ft. long, with an O. D. of 14 inches, in which is housed 4-pass, ¾-in O. D. x No. 16 Admiralty Metal tubes which are rolled and expanded into steel tube sheets. Cold feedwater in this closed system of preheating is pumped into the tubes under pressure by a feed pump. Source of steam can be the exhaust of engines, pumps or auxiliary

turbines under pressure. Steam contacts the tubes, imparting its heat to the water through the walls of the tubes. In this closed system the feedwater can never be contaminated by the lubricating oil in the exhaust steam. Any oil separators, filters or grease extractors are, therefore, unnecessary to maintain the purity of boiler water.

In operation, average installations reveal a saving of approximately 1% of fuel for each 11°F. that the feedwater is raised in temperature. Preheating boiler feedwater will also reduce temperature strains on the boiler. In operation, boiler tubes and plates are hot, especially those parts exposed directly to radiant heat. When cold water contacts these parts, cooling and local contraction set up excessive strains. These, in addition to normal strains produced by steam pressure, may tax the seams, causing leakage to take place. Preheating of feedwater nullifies this possibility.

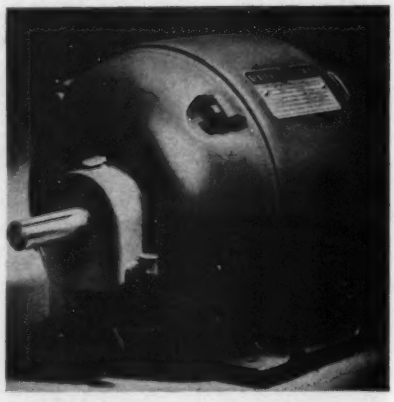
The feedwater heater has the ability of removing a large proportion of certain scale forming impurities by heating the water before it enters the boiler, raising boiler efficiency, by effecting proper heat transfer. The shell of the feedwater heater is designed for 10 lbs. steam pressure; tubes are designed for up to 450 lbs. water pressure. Heads are removable, permitting ready inspection or cleaning of tubes. Steam inlet nozzle and condensate nozzle are 8-in., Series 150 flanges; feedwater nozzles are 3-in., Series 300 flanges. Impingement baffle at inlet steam nozzle prevents cutting action of possible wet steam on tubes. Shipping weight is 1570 lbs. A new bulletin may be obtained on this piece of equipment by writing Natural Gas Equipment Inc., 539 Petroleum Building, Los Angeles. It is complete with a chart which shows how to compute fuel savings at any boiler plant.

You are reading the Pacific Coast oil men's home paper.

Brown Instrument Co. Flow Meter Bulletin

The Brown Instrument Co. has just published a new catalog No. 2007. This catalog covers the complete line of Brown Electric Flow Meters for the measurement and control of steam, air, oil, water, chemicals and other fluids.

Schematic diagrams of the Brown Electric Meter Body, High Pressure Electric Meter Body, Low Pressure Electric Meter Body, Area Meter Body and piping layouts are shown. Outstanding design features such as rectangular case, automatic recording planimeter pen, interrelated range tubes, etc. and operating principle of Brown Electric Flow Meters are fully described. A copy of this catalog will be sent on request. Address: The Brown Instrument Co., Wayne & Roberts Avenues, Pholadelphia, Pa.



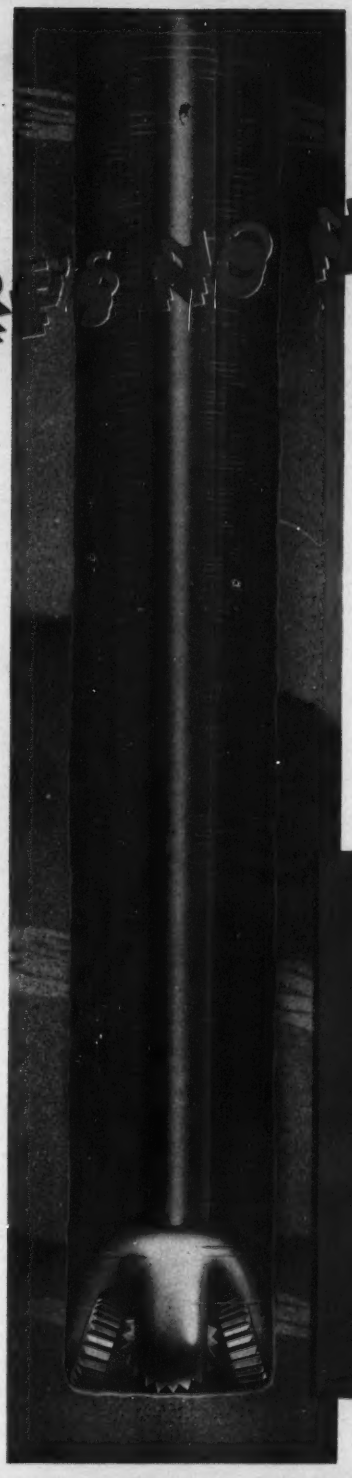
The new General Electric Tri-clad polyphase induction motor has three principal features: (1) better mechanical protection through the use of a cast-iron box-type frame; (2) better electrical protection made possible by Formex, a new type magnet wire; and (3) better protection against operating wear and tear through a new design of sleeve bearings, according to General Electric engineers.

Norwood Tests Coronet No. 4

With hole bottomed at 3250 ft. and the liner cemented through perforations at 3130 ft., Norwood Oil Co. is trying to complete Coronet No. 4 in the old producing area between Ojai and Santa Paula. Perforations were washed with chemical to facilitate movement of oil into the hole. Unconfirmed late reports were to the effect that the well was flowing to the sump but the character of the fluid was unknown.

Motorcycle plane, demonstrated recently, can take off and land in a small space, has a speed ranging from a "hover" in mid-air to a fast clip.

THERE'S NO NEED FOR THIS!"



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***What's more, vibration cuts drilling efficiency*—for a dancing bit can't drill as straight, or as fast, as a bit centered firmly in the hole.**

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BETTER DIRECTIONAL DRILLING—The diagonal wall contact gives better bearing area for holding the bit to a pre-determined course.

HIGHER CORING EFFICIENCY—A Sievers Reamer above the core barrel holds the barrel centralized on its true axis. Result—higher recovery, less core breakage.

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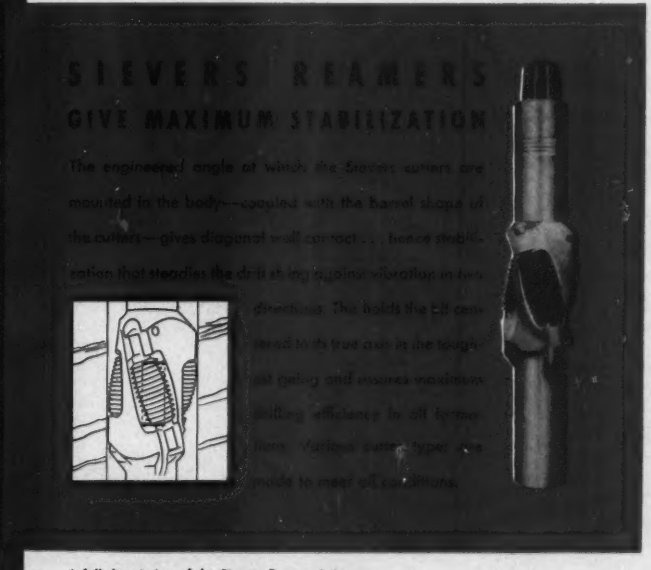
WHETHER IT'S REAMING OR STABILIZING—OR BOTH—YOU'LL DO IT BETTER WITH A SIEVERS!



A full description of the Sievers Reamer is in your Composite Catalog & Drilling Equipment Directory.

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The best proof that even the smallest advertisement in the California Oil World is read, is that you are now reading this.

BIDS ON OIL LEASE SALE

Nov. 25, 1940.—United States Department of the Interior, District Land Office, Sacramento, California. Notice is hereby given that the SE¼ NE¼ Sec. 4, NE¼ NE¼, except the S½ SE¼ NE¼ NE¼, Sec. 27, T. 32 S., R. 23 E., M.D.M., California, containing 75 acres in the Midway Field, California, are offered to the responsible qualified bidder of the highest bonus per acre for lease under section 17 of the act of February 25, 1920 (41 Stat. 437), as amended by the act of August 21, 1935 (49 Stat. 674), at the royalty rate scale in the lease form shown in Circular 1386, at a sale to be held in the District Land Office, Sacramento, California, at 11:00 o'clock, a.m., on Feb. 11, 1941. The successful bidder must deposit on the date of the sale a certified check on a solvent bank, or cash, for 1/5 of the amount bid, and file the showing of qualifications to receive a lease, required by section 7 of Circular 1386. The remainder of the bonus bid and the annual rental of $1 per acre must be paid and a $5000 corporate surety bond must be furnished prior to the issuance of the lease. The bidders are warned against violation of the provisions of Sec. 59 of the United States Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids at the discretion of the Secretary of the Interior. Ellis Purlee, Register. 2/5t

Oil Men's Calendar

Calif. Natural Gasoline Association. **Los Angeles Chapter**—Meets 1st Thursday Each Month, Barker Bros. Bldg., Los Angeles—Dinner at 6:00 (Optional). **Taft Chapter**—Meets Third Thursday Each Month.

American Society of Mechanical Engineers—Los Angeles Section—Meets 2nd Thursday Each Month—Barker Bros. Bldg., Los Angeles. Dinner at 6:30 (Optional).

1941

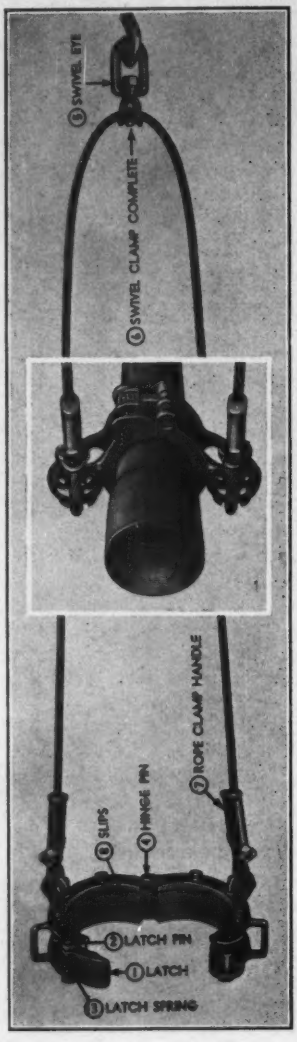
January

6-10—Society of Automotive Engineers, Annual Meeting (and Engineering Display), Book-Cadillac Hotel, Detroit, Mich.

Elevator Eliminates Use of Rope Sling

This elevator eliminates use of the rope sling and prevents the pipe from slipping or falling with damage to the pipe or injury to the crew. The Type P Elevator is made in two halves, hinged at the center, and latched opposite the hinge by a sturdy stirrup-type latch. The bore of the elevator contains slips set to receive a 5 degree tapered external upset casing joint.

A flexible wire line bail having a clamp and swivel at the top keeps the elevator in a true, balanced position, and the ends of the wire line are protected by hand guards. The free spinning swivel on the clamp has an eye sufficiently large to accommodate any desired means of attaching it to the hook or hoisting elevator.



The Type P Elevator is used as follows: When the slips are being set in the spider (after the previous joint has been set in the hole) one of the crew closes the elevator around the next joint on the derrick floor. Then, when the block and hook are raised, the joint of pipe is lifted to the required height where it hangs in a true vertical position so that the pin may be easily and safely lowered into the coupling without danger of developing a cross-thread.

Complete details as to price, construction and operation are available from Byron Jackson Co., P. O. Box 2017 Terminal Annex, Los Angeles, California.